OM-242 880B 2010–05

Processes

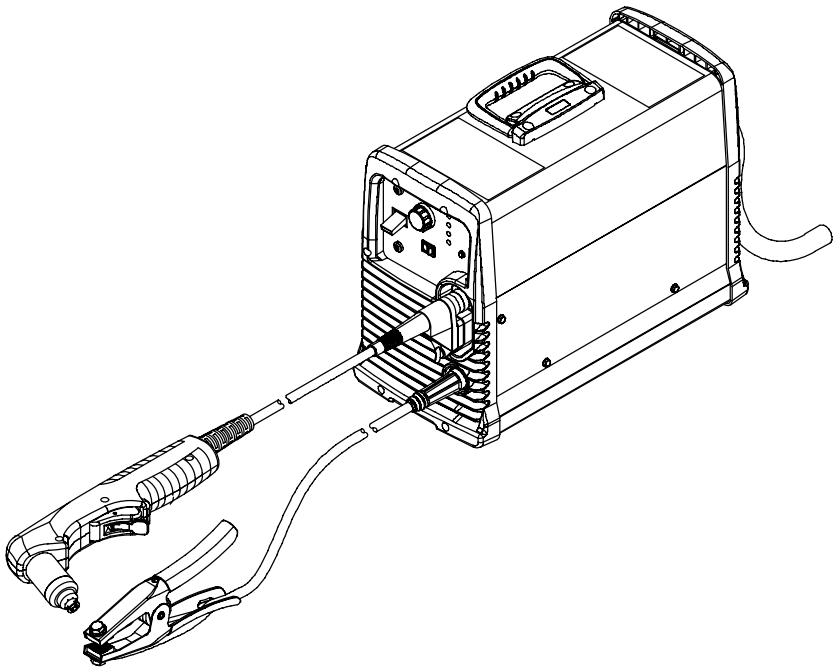
Air Plasma Cutting and Gouging

Description

DC 1 Phase 3 Phase

Air Plasma Cutter

Spectrum® 875 Auto-Line And ICE-60T/TM Torch



OWNER'S MANUAL

File: Plasma Cutters

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From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

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SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

Protect yourself and others from injury — read and follow these precautions.

1-1. Symbol Usage

DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE *– Indicates statements not related to personal injury.*

☞ *Indicates special instructions.*

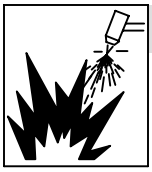
This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Plasma Arc Cutting Hazards

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children, away.



CUTTING can cause fire or explosion.

Hot metal and sparks blow out from the cutting arc. The flying sparks and hot metal, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any cutting.

- Remove all flammables within 35 ft (10.7 m) of the cutting arc. If this is not possible, tightly cover them with approved covers.
- Do not cut where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that sparks and hot materials from cutting can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not cut on closed containers such as tanks or drums.
- Connect work cable to the work as close to the cutting area as practical to prevent cutting current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use plasma cutter to thaw frozen pipes.
- Never cut containers with potentially flammable materials inside – they must be emptied and properly cleaned first.
- Do not cut where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Do not cut pressurized cylinders, pipes, or vessels.
- Do not cut containers that have held combustibles.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Do not locate unit on or over combustible surfaces.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any cutting.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or bypass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.

ELECTRIC SHOCK can kill.

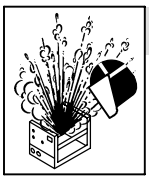
Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Plasma arc cutting requires higher voltages than welding to start and maintain the arc (200 to 400 volts dc are common), but may also use torches designed with safety interlock systems which turn off the machine when the shield cup is loosened or if tip touches electrode inside the nozzle. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not touch torch parts if in contact with the work or ground.
- Turn off power before checking, cleaning, or changing torch parts.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet – always verify the supply ground.
- When making input connections, attach proper grounding conductor first.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Inspect and replace any worn or damaged torch cable leads.
- Do not wrap torch cable around your body.
- Ground the workpiece to a good electrical (earth) ground if required by codes.
- Use only well-maintained equipment. Repair or replace damaged parts at once.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Do not bypass or try to defeat the safety interlock systems.
- Use only torch(es) specified in Owner's Manual.
- Keep away from torch tip and pilot arc when trigger is pressed.
- Clamp work cable with good metal-to-metal contact to workpiece (not piece that will fall away) or worktable as near the cut as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.

ELECTRIC SHOCK can kill.

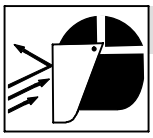
SIGNIFICANT DC VOLTAGE exists in inverter power sources AFTER the removal of input power.

- Turn Off unit, disconnect input power, check voltage on input capacitors, and be sure it is near zero (0) volts before touching any parts. Check capacitors according to instructions in Maintenance Section of Owner's Manual or Technical Manual before touching any parts.



EXPLODING PARTS can injure.

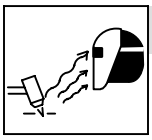
- On inverter power sources, failed parts can explode or cause other parts to explode when power is applied. Always wear a face shield and long sleeves when servicing inverters.



FLYING SPARKS can injure.

Sparks and hot metal blow out from the cutting arc. Chipping and grinding cause flying metal.

- Wear approved face shield or safety goggles with side shields.
- Wear proper body protection to protect skin.
- Wear flame-resistant ear plugs or ear muffs to prevent sparks from entering ears.



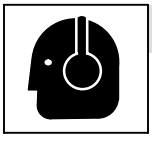
ARC RAYS can burn eyes and skin.

Arc rays from the cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

- Wear face protection (helmet or shield) with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when cutting or watching. ANSI Z49.1 (see Safety Standards) suggests a No. 9 shade (with No. 8 as minimum) for all cutting currents less than 300 amperes. Z49.1 adds that lighter filter shades may be used when the arc is hidden by the workpiece. As this is normally the case with low current cutting, the shades suggested in Table 1 are provided for the operator's convenience.
- Wear approved safety glasses with side shields under your helmet or shield.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

Table 1. Eye Protection For Plasma Arc Cutting

Current Level In Amperes			Minimum Shade Number
Below 20			#4
20 – 40			#5
40 – 60			#6
60 – 100			#8



NOISE can damage hearing.

Prolonged noise from some cutting applications can damage hearing if levels exceed limits specified by OSHA (see Safety Standards).

- Use approved ear plugs or ear muffs if noise level is high.
- Warn others nearby about noise hazard.

FUMES AND GASES can be hazardous.

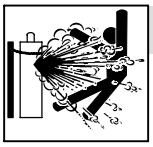
Cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove cutting fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals to be cut, coatings, and cleaners.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Fumes from cutting and oxygen depletion can alter air quality causing injury or death. Be sure the breathing air is safe.
- Do not cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the cutting area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes when cut.
- Do not cut containers with toxic or reactive materials inside or containers that have held toxic or reactive materials – they must be emptied and properly cleaned first.

PLASMA ARC can injure.

The heat from the plasma arc can cause serious burns. The force of the arc adds greatly to the burn hazard. The intensely hot and powerful arc can quickly cut through gloves and tissue.

- Keep away from the torch tip.
- Do not grip material near the cutting path.
- The pilot arc can cause burns – keep away from torch tip when trigger is pressed.
- Wear proper flame-retardant clothing covering all exposed body areas.
- Point torch away from your body and toward work when pressing the torch trigger – pilot arc comes on immediately.
- Turn off power source and disconnect input power before disassembling torch or changing torch parts.
- Use only torch(es) specified in the Owner's Manual.



CYLINDERS can explode if damaged.

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of metalworking processes, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flame, sparks, and arcs.
- Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
- Keep cylinders away from any cutting or other electrical circuits.
- Never allow electrical contact between a plasma arc torch and a cylinder.
- Never cut on a pressurized cylinder – explosion will result.
- Use only correct gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

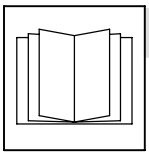
1-3. Additional Symbols For Installation, Operation, And Maintenance

HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

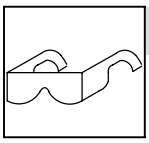
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.

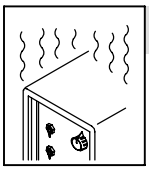


FLYING METAL or DIRT can injure eyes.

- Wear safety glasses with side shields or wear face shield.

ELECTRIC AND MAGNETIC FIELDS (EMF) can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.

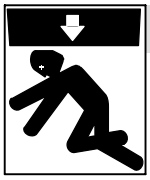


OVERUSE can cause OVERHEATING.

- Allow cooling period; follow rated duty cycle.
- Reduce amperage (thickness) or reduce duty cycle before starting to cut again.

EXPLODING HYDROGEN hazard.

- When cutting aluminum underwater or with the water touching the underside of the aluminum, free hydrogen gas may collect under the workpiece.
- See your cutting engineer and water table instructions for help.

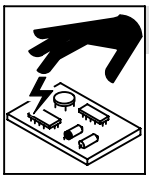


FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94–110) when manually lifting heavy parts or equipment.

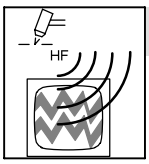
FIRE OR EXPLOSION hazard.

- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



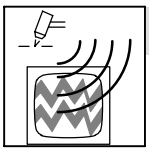
STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



ARC CUTTING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- To reduce possible interference, keep cables as short as possible, close together, and down low, such as on the floor.
- Locate cutting operation 100 meters from any sensitive electronic equipment.
- Be sure this cutting power source is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the machine, using shielded cables, using line filters, or shielding the work area.

1-4. California Proposition 65 Warnings

Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. *Wash hands after handling.*

This product contains chemicals, including lead, known to the state of California to cause cancer, birth defects, or other reproductive harm. *Wash hands after use.*

For Gasoline Engines:

Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

For Diesel Engines:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

1-5. Principal Safety Standards

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting and Gouging, American Welding Society Standard AWS C5.2, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org and www. sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (phone: 703-788-2700, website:www.cganet.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (phone: 800-463-6727, website: www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (phone: 212-642-4900, website: www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, from National Fire Protection Association, Quincy, MA 02269 (phone: 1-800-344-3555, website: www.nfpa.org.

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone: 1-866-512-1800) (there are 10 OSHA Regional Offices—phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333 (phone: 1-800-232-4636, website: www.cdc.gov/NIOSH).

1-6. EMF Information

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). Welding current creates an EMF field around the welding circuit and welding equipment. EMF fields may interfere with some medical implants, e.g. pacemakers. Protective measures for persons wearing medical implants have to be taken. For example, access restrictions for passers–by or individual risk assessment for welders. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

1. Keep cables close together by twisting or taping them, or using a cable cover.
2. Do not place your body between welding cables. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep head and trunk as far away from the equipment in the welding circuit as possible.
5. Connect work clamp to workpiece as close to the weld as possible.
6. Do not work next to, sit or lean on the welding power source.
7. Do not weld whilst carrying the welding power source or wire feeder.

About Implanted Medical Devices:

Implanted Medical Device wearers should consult their doctor and the device manufacturer before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations. If cleared by your doctor, then following the above procedures is recommended.

SECTION 2 – CONSIGNES DE SÉCURITÉ – LIRE AVANT UTILISATION

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Se protéger et protéger les autres contre le risque de blessure — lire et respecter ces consignes.

2-1. Signification des symboles

DANGER! – Indique une situation dangereuse qui si on l'évite pas peut donner la mort ou des blessures graves. Les dangers possibles sont montrés par les symboles joints ou sont expliqués dans le texte.

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***NOTE** – Indique des déclarations pas en relation avec des blessures personnelles.*

☞ *Indique des instructions spécifiques.*

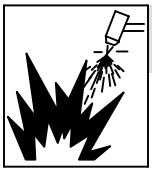
Ce groupe de symboles veut dire Avertissement! Attention! DANGER DE CHOC ELECTRIQUE, PIECES EN MOUVEMENT, et PIECES CHAUDES. Consulter les symboles et les instructions ci-dessous y afférant pour les actions nécessaires afin d'éviter le danger.

2-2. Dangers liés au coupage à l'arc au plasma

Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-5. Veuillez lire et respecter toutes ces normes de sécurité.

L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.

Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.



LE COUPAGE présente un risque de feu ou d'explosion.

Des particules de métal chaud et des étincelles peuvent jaillir de la pièce au moment du coupage. Les étincelles et le métal chaud, la pièce à couper chauffée et l'équipement chaud peuvcnt causer un feu ou des brûlures. Avant de commencer à travailler, assurez-vous que l'endroit est sécuritaire.

- Déplacez toute matière inflammable se trouvant à l'intérieur d'un périmètre de 10,7 m (35 pi) de la pièce à couper. Si cela est impossible, vous devez les couvrir avec des housses approuvées et bien ajustées.
- Ne coupez pas dans un endroit où des étincelles pourraient atteindre des matières inflammables.
- Protégez–vous, ainsi que toute autre personne travaillant sur les lieux, contre les étincelles et le métal chaud.
- Assurez–vous qu'aucune étincelle ni particule de métal ne peut se glisser dans de petites fissures ou tomber dans d'autres pièces.
- Afin d'éliminer tout risque de feu, soyez vigilant et gardez toujours un extincteur à la portée de la main.
- Si vous coupez sur un plafond, un plancher ou une cloison, soyez conscient que cela peut entraîner un feu de l'autre côté.
- Ne coupez pas sur un contenant fermé tel qu'un réservoir ou un bidon.
- Fixez le câble de masse sur la pièce à couper, le plus près possible de la zone à couper afin de prévenir que le courant de coupage ne prenne une trajectoire inconnue ou longue et ne cause ainsi une décharge électrique, d'étincelles ou un feu.
- Ne pas utiliser le coupeur plasma pour dégeler des conduites gelées.
- Ne coupez jamais des contenants qui peuvent contenir des matières inflammables. Vous devez en premier lieu les vider et les nettoyer convenablement.
- Ne coupez pas quand l'atmosphère peut contenir des poussières, gaz ou vapeurs (comme l'essence) inflammables.
- Ne coupez pas dans un endroit où l'atmosphère risque de contenir de la poussière ou des vapeurs explosives.
- Ne coupez pas de bouteilles, de tuyaux ou de contenants pressurisés.
- Ne coupez pas de contenants qui ont déjà reçu des combustibles.
- Portez des vêtements de protection exempts d'huile tels que des gants en cuir, une veste résistante, des pantalons sans revers, des bottes et un casque.
- Ne placez pas le poste sur une surface combustible ou au–dessus de celle–ci.
- Une fois le travail achevé, assurez–vous qu'il ne reste aucune trace d'étincelles incandescentes ni de flammes.
- Utiliser exclusivement des fusibles ou coupe–circuits appropriés. Ne pas augmenter leur puissance; ne pas les ponter.
- Avant le coupage, retirez tout combustible de vos poches, par exemple un briquet au butane ou des allumettes.

UN CHOC ÉLECTRIQUE peut tuer.

Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Le coupage plasma nécessite des tensions plus importantes que le soudage pour amorcer et maintenir l'arc (200 à 400VDC est typique), mais peut être utilisé avec des torches équipées de systèmes de verrouillage de sécurité qui arrêtent la machine en cas de buse desserrée ou si l'électrode touche la tuyère. Incorrectly installed or improperly grounded equipment is a hazard.

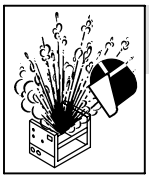
- Ne touchez pas aux pièces électriques sous tension.
- Portez des gants isolants et des vêtements de protection secs et sans trous.
- Isolez–vous de la pièce à couper et du sol en utilisant des housses ou des tapis assez grands afin d'éviter tout contact physique avec la pièce à couper ou le sol.
- Ne touchez pas aux pièces du chalumeau si vous êtes en contact avec la pièce à couper ou le sol.
- Mettez l'appareil hors tension avant d'effectuer la vérification, le nettoyage ou le changement d'une pièce du chalumeau.
- Coupez l'alimentation d'entrée avant d'installer l'appareil ou d'effectuer l'entretien. Verrouillez ou étiquetez la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (reportez–vous aux Principales normes de sécurité).
- Installez le poste correctement et mettez-le à la terre convenablement selon les consignes du manuel de l'opérateur et les normes nationales, provinciales et locales.

- Assurez–vous que le fil de terre du cordon d'alimentation est correctement relié à la borne de terre dans la boîte de coupure ou que la fiche du cordon est branchée à une prise correctement mise à la terre – vous devez toujours vérifier la mise à la terre.
- Avant d'effectuer les connexions d'alimentation, vous devez relier le bon fil de terre.
- Les câbles doivent être exempts d'humidité, d'huile et de graisse; protégez–les contre les étincelles et les pièces métalliques chaudes.
- Vérifiez fréquemment le cordon d'alimentation afin de vous assurer qu'il n'est pas altéré ou à nu, remplacez–le immédiatement s'il l'est. Un fil à nu peut entraîner la mort.
- L'équipement doit être hors tension lorsqu'il n'est pas utilisé.
- Vérifiez et remplacez les cosses du câble du chalumeau si elles sont usées ou altérées.
- Le câble du chalumeau ne doit pas s'enrouler autour de votre corps.
- Si les normes le stipulent, la pièce à couper doit être mise à la terre.
- Utilisez uniquement de l'équipement en bonne condition. Réparez ou remplacez immédiatement toute pièce altérée.
- Portez un harnais de sécurité si vous devez travailler au–dessus du sol.
- Assurez–vous que tous les panneaux et couvercles sont correctement en place.
- N'essayez pas d'aller à l'encontre des systèmes de verrrouillage de sécurité ou de les contourner.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l'opérateur.
- N'approchez pas le tube du chalumeau et l'arc pilote lorsque la gâchette est enfoncée.
- Le câble de masse doit être pincé correctement sur la pièce à couper, métal contre métal (et non de telle sorte qu'il puisse se détacher), ou sur la table de travail le plus près possible de la ligne de coupage.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

DÉCHARGES ÉLECTRIQUES potentiellement mortelles.

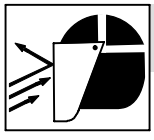
Il reste une TENSION DC NON NÉGLIGEABLE dans les sources de soudage onduleur UNE FOIS l'alimentation coupée.

- Mettre l'unité hors tension, mesurer la tension des condensateurs d'entrée et s'assurer qu'elle est pratiquement nulle avant de toucher à l'une quelconque des pièces. Mesurer cette tension conformément aux directives énoncées à la section Entretien du manuel de l'utilisateur ou du manuel technique avant de toucher à l'une quelconque des pièces.



Risque de blessure en cas D'EXPLOSION DES PIÈCES.

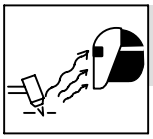
- Mise sous tension, toute pièce défectueuse des sources d'alimentation de l'inverseur peut exploser ou faire exploser d'autres pièces. Pour entretenir les inverseurs, toujours porter un masque protecteur et un vêtement à manches longues.



LES ÉTINCELLES PROJETÉES peuvent provoquer des blessures.

Le coupage plasma produit des étincelles et projections de métal à très haute température. Lorsque la pièce refroidit, du laitier peut se former.

- Portez une visière ou des lunettes de sécurité avec des écrans latéraux approuvées.
- Portez des vêtements de protection adéquats afin de protéger votre peau.
- Ayez recours à des protège–tympans ou à un serre–tête ignifuges afin d'éviter que les étincelles n'entrent dans vos oreilles.



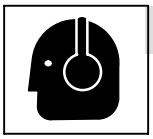
LES RAYONS D'ARC peuvent entraîner des brûlures aux yeux et à la peau.

Les rayons d'arc provenant du procédé de coupage produisent des rayons visibles et invisibles intenses (ultraviolets et infrarouges) qui peuvent entraîner des brûlures aux yeux et à la peau.

- Une protection faciale (casque ou masque) avec des lunettes filtrantes de teinte adéquate est indispensable pour protéger le visage et les yeux des rayonnements de l'arc et des étincelles pendant la découpe ou en regardant simplement ANSI Z49.1 (reportez–vous aux Principales normes de sécurité) suggère d'utiliser un filtre de teinte n○ 9 (n○ 8 étant le minimum) pour tout travail de coupage faisant appel à un courant de moins de 300 A. On mentionne également dans la norme Z49.1 qu'un filtre plus faible peut être utilisé lorsque l'arc est caché par la pièce à couper. Comme cela est habituellement le cas pour les travaux de coupage à faible courant, les teintes énumérées au tableau 1 sont fournies à titre d'information pour l'opérateur.
- Porter des lunettes de sécurité à coques latérales sous votre casque ou écran facial.
- Ayez recours à des écrans protecteurs ou à des rideaux pour protéger les autres contre les rayonnements, les étincelles et les éblouissements; prévenez toute personne sur les lieux de ne pas regarder l'arc.
- Portez des vêtements confectionnés avec des matières résistantes et ignifuges (cuir, coton lourd ou laine) et des bottes de protection.

Tableau 1. Protection des yeux pour le coupage au plasma d'arc

Intensité de courant en ampères	Filtre de teinte (minimum)
Moins de 20	no. 4
20 – 40	no. 5
40 – 60	no. 6
60 – 100	no. 8



LE BRUIT peut endommager l'ouïe.

Certaines applications de coupage produisent un bruit constant, ce qui peut endommager l'ouïe si le niveau sonore dépasse les limites permises par l'OSHA (reportez–vous aux Principales normes de sécurité).

- Utilisez des protège–tympans ou un serre–tête antibruit si le niveau sonore est élevé.
- Prévenez toute personne sur les lieux du danger relié au bruit.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le coupage produit des vapeurs et des gaz. Respirer ces vapeurs et ces gaz peut être dangereux pour la santé.

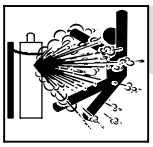
- Ne mettez pas votre tête au–dessus des vapeurs. Ne respirez pas ces vapeurs.
- Si vous êtes à l'intérieur au moment du coupage, ventilez la pièce ou ayez recours à une ventilation aspirante installée près de l'arc pour évacuer les vapeurs et les gaz.
- Si la ventilation est médiocre, utilisez un respirateur anti–vapeurs approuvé.
- Lire et comprendre les spécifications de sécurité des matériaux (MSDS) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travaillez dans un espace restreint uniquement s'il est bien ventilé ou si vous portez un respirateur anti–vapeurs. Les vapeurs causées par le coupage et l'épuisement de l'oxygène peuvent altérer la qualité de l'air et entraîner des blessures ou la mort. Assurez–vous que l'air ambiant est sain pour la santé.

- Ne coupez pas dans un endroit près d'opérations de décapage, de nettoyage ou de vaporisation. La chaleur et les rayons d'arc peuvent réagir avec les vapeurs et former des gaz hautement toxiques et irritants.
- Ne coupez pas des métaux enrobés tels que des métaux galvanisés, contenant du plomb ou de l'acier plaqué au cadmium, à moins que l'enrobage ne soit ôté de la surface du métal à couper, que l'endroit où vous travaillez ne soit bien ventilé, ou que vous ne portiez un respirateur anti–vapeurs. Les enrobages ou tous métaux qui contiennent ces éléments peuvent créer des vapeurs toxiques s'ils sont coupés.
- Ne coupez pas de contenants qui renferment ou ont renfermés des matières toxiques ou réactives – vous devez en premier lieu les vider et les nettoyer convenablement.

L'ARC PLASMA peut provoquer des blessures.

La chaleur dégagée par le plasma d'arc peut entraîner de sérieuses brûlures. La force de l'arc est un facteur qui s'ajoute au danger de brûlures. La chaleur intense et la puissance de l'arc peuvent rapidement passer au travers de gants et de tissus.

- N'approchez pas le tube du chalumeau.
- Ne saisissez pas la pièce à couper près de la ligne de coupage.
- L'arc pilote peut causer des brûlures – n'approchez pas le tube du chalumeau lorsque vous avez appuyé sur le gâchette.
- Portez des vêtements de protection adéquats qui recouvrent tout votre corps.
- Ne pointez pas le chalumeau en direction de votre corps ni de la pièce à couper lorsque vous appuyez sur la gâchette – l'arc pilote s'allume automatiquement.
- Mettez l'alimentation hors tension et débranchez le cordon d'alimentation avant de démonter le chalumeau ou de changer une pièce du chalumeau.
- Utilisez uniquement le ou les chalumeaux recommandés dans le manuel de l'opérateur.



LES BOUTEILLES peuvent exploser si elles sont endommagées.

Les bouteilles de gaz contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Puisque les bouteilles de gaz font habituellement partie d'un processus de travail des métaux, assurez–vous de les manipuler correctement.

- Protégez les bouteilles de gaz comprimé contre la chaleur excessive, les chocs mécaniques, des dommages physiques, le laitier, la flamme, les étincelles et l'arc.
- Installez et attachez les bouteilles dans la position verticale à l'aide d'une chaîne, sur un support stationnaire ou un châssis porte–bouteille afin de prévenir qu'elles ne tombent ou ne basculent.
- Les bouteilles ne doivent pas être près de la zone de coupage ni de tout autre circuit électrique.
- Un contact électrique ne doit jamais se produire entre un chalumeau de plasma d'arc et une bouteille.
- Ne coupez jamais sur une bouteille pressurisée – une explosion en résulterait.
- Utilisez uniquement des bouteilles de gaz, des détendeurs, des boyaux et des raccords conçus pour l'application déterminée. Gardez–les, ainsi que toute autre pièce associée, en bonne condition.
- Détournez votre visage du détendeur–régulateur lorsque vous ouvrez la soupape de la bouteille.
- Le couvercle du détendeur doit toujours être en place, sauf lorsque vous utilisez la bouteille ou qu'elle est reliée pour usage ultérieur.
- Utiliser les équipements corrects, les bonnes procédures et suffisamment de personnes pour soulever et déplacer les bouteilles.
- Lire et suivre les instructions sur les bouteilles de gaz comprimé, l'équipement connexe et le dépliant P-1 de la CGA (Compressed Gas Association) mentionné dans les principales normes de sécurité.

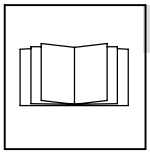
2-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

LES PIÈCES CHAUDES peuvent provoquer des brûlures.

- Ne pas toucher des parties chaudes à mains nues.
- Prévoir une période de refroidissement avant d'utiliser l'équipement.
- Ne pas toucher aux pièces chaudes, utiliser les outils recommandés et porter des gants de soudage et des vêtements épais pour éviter les brûlures.

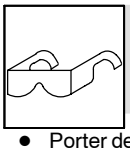
Les PIÈCES MOBILES peuvent provoquer des blessures.

- S'abstenir de toucher des organes mobiles tels que des ventilateurs.
- Maintenir fermés et verrouillés les portes, panneaux, recouvrements et dispositifs de protection.
- Lorsque cela est nécessaire pour des travaux d'entretien et de dépannage, faire retirer les portes, panneaux, recouvrements ou dispositifs de protection uniquement par du personnel qualifié.
- Remettre les portes, panneaux, recouvrements ou dispositifs de protection quand l'entretien est terminé et avant de rebrancher l'alimentation électrique.



LIRE LES INSTRUCTIONS.

- Lire et appliquer les instructions sur les étiquettes et le Mode d'emploi avant l'installation, l'utilisation ou l'entretien de l'appareil. Lire les informations de sécurité au début du manuel et dans chaque section.
- N'utiliser que les pièces de rechange recommandées par le constructeur.
- Effectuer l'entretien en respectant les manuels d'utilisation, les normes industrielles et les codes nationaux, d'état et locaux.

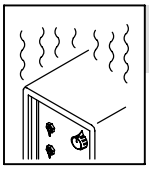


DES PIECES DE METAL ou DES SALETES peuvent provoquer des blessures dans les yeux.

- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

Les CHAMPS ÉLECTROMAGNÉTIQUES (CEM) peuvent affecter les implants médicaux.

- Les porteurs de stimulateurs cardiaques et autres implants médicaux doivent rester à distance.
- Les porteurs d'implants médicaux doivent consulter leur médecin et le fabricant du dispositif avant de s'approcher de la zone où se déroule du soudage à l'arc, du soudage par points, du gougeage, de la découpe plasma ou une opération de chauffage par induction.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement; respecter le cycle opératoire nominal.
- Réduire l'ampérage (épaisseur) avant de continuer à couper ou réduire le facteur de marche.

Danger D'EXPLOSION D'HYDROGÈNE.

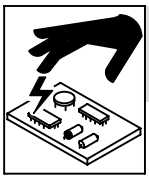
- Lors du coupage d'aluminium partiellement ou totalement immergé dans l'eau, de l'hydrogène libre peut s'accumuler sous la pièce.
- Consultez votre ingénieur de coupage et les instructions de la table de coupage.

LA CHUTE DE L'ÉQUIPEMENT peut provoquer des blessures.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.
- Tenir l'équipement (câbles et cordons) à distance des véhicules mobiles lors de toute opération en hauteur.
- Suivre les consignes du Manuel des applications pour l'équation de levage NIOSH révisée (Publication Nº94–110) lors du levage manuelle de pièces ou équipements lourds.

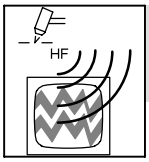
Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infflammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique – s'assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.



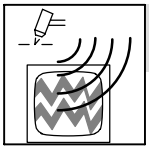
LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Etablir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le Rayonnement haute frequence (H.F.) peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.



LE COUPAGE Ã L'ARC peut causer des interférence.

- L'énergie électromagnétique peut gêner le fonctionnement d'appareils électroniques comme des ordinateurs et des robots.
- Pour réduire la possibilité d'interférence, maintenir les câbles aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à couper à une distance de 100 mètres de tout équipement électronique sensible.
- S'assurer que la source de coupage est correctement branchée et mise à la terre.
- Si l'interférence persiste, l'utilisateur doit prendre des mesures supplémentaires comme écarter la machine, utiliser des câbles blindés de des filtres, ou boucler la zone de travail.

2-4. Proposition californienne 65 Avertissements

⚠ Les équipements de soudage et de coupage produisent des fumées et des gaz qui contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des malformations congénitales et, dans certains cas, des cancers. (Code de santé et de sécurité de Californie, chapitre 25249.5 et suivants)

⚠ Ce produit contient des produits chimiques, compris du plomb, dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation. *Se laver les mains après manipulation.*

⚠ Ce produit contient des éléments chimiques, dont le plomb, reconnus par l'État de Californie pour leur caractère cancérogène ainsi que provoquant des malformations congénitales ou autres problèmes de procréation. *Se laver les mains après toute manipulation.*

Pour les moteurs à essence :

⚠ Les gaz d'échappement des moteurs contiennent des produits chimiques dont l'État de Californie reconnaît qu'ils provoquent des cancers et des malformations congénitales ou autres problèmes de procréation.

Pour les moteurs diesel :

⚠ Les gaz d'échappement des moteurs diesel et certains de leurs composants sont reconnus par l'État de Californie comme provoquant des cancers et des malformations congénitales ou autres problèmes de procréation.

2-5. Principales normes de sécurité

Safety in Welding, Cutting, and Allied Processes, ANSI Standard Z49.1, de Global Engineering Documents (téléphone : 1-877-413-5184, site Internet : www.global.ihs.com).

Recommended Practices for Plasma Arc Cutting and Gouging, American Welding Society Standard AWS C5.2, de Global Engineering Documents (téléphone : 1-877-413-5184, site internet : www.global.ihs.com).

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1, de Global Engineering Documents (téléphone: 1-877-413-5184, site internet : www.global.ihs.com).

National Electrical Code, NFPA Standard 70, de National Fire Protection Association, Quincy, MA 02269 (téléphone : 1-800-344-3555, site Internet : www.nfpa.org et www.sparky.org).

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de Compressed Gas Association, 4221 Walney Road, 5th Floor, Chantilly, VA 20151 (téléphone : 703-788-2700, site Internet : www.cganet.com).

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2, de Canadian Standards Association, Standards Sales, 5060 Spectrum Way, Suite 100, Ontario, Canada L4W 5NS (téléphone : 800-463-6727, site internet : www.csa-international.org).

Safe Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, de American National Standards Institute, 25 West 43rd Street, New York, NY 10036 (téléphone : 212-642-4900, site Internet : www.ansi.org).

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, NFPA Standard 51B, de National Fire Protection Association, Quincy, MA 02269 (téléphone : 1-800-344-3555, site Internet : www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, de U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (téléphone : 1-866-512-1800) (il y a 10 bureaux régionaux –le téléphone de la région 5, Chicago, est 312-353-2220, site Internet : www.osha.gov).

Applications Manual for the Revised NIOSH Lifting Equation, The National Institute for Occupational Safety and Health (NIOSH), 1600 Clifton Rd, Atlanta, GA 30333
(téléphone: 1-800-232-4636, site internet : www.cdc.gov/NIOSH).

2-6. Informations relatives aux CEM

Le courant électrique qui traverse tout conducteur génère des champs électromagnétiques (CEM) à certains endroits. Le courant de soudage crée un CEM autour du circuit et du matériel de soudage. Les CEM peuvent créer des interférences avec certains implants médicaux comme des stimulateurs cardiaques. Des mesures de protection pour les porteurs d'implants médicaux doivent être prises: par exemple, des restrictions d'accès pour les passants ou une évaluation individuelle des risques pour les soudeurs. Tous les soudeurs doivent appliquer les procédures suivantes pour minimiser l'exposition aux CEM provenant du circuit de soudage:

1. Rassembler les câbles en les torsadant ou en les attachant avec du ruban adhésif ou avec une housse.
2. Ne pas se tenir au milieu des câbles de soudage. Disposer les câbles d'un côté et à distance de l'opérateur.
3. Ne pas courber et ne pas entourer les câbles autour de votre corps.
4. Maintenir la tête et le torse aussi loin que possible du matériel du circuit de soudage.
5. Connecter la pince sur la pièce aussi près que possible de la soudure.
6. Ne pas travailler à proximité d'une source de soudage, ni s'asseoir ou se pencher dessus.
7. Ne pas souder tout en portant la source de soudage ou le dévidoir.

En ce qui concerne les implants médicaux :

Les porteurs d'implants doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de soudage par points, de gougeage, du coupage plasma ou de chauffage par induction. Si le médecin approuve, il est recommandé de suivre les procédures précédentes.

SECTION 3 – DEFINITIONS

3-1. Symbols And Definitions For Nameplate And Serial Number/Rating Label

A	Amperes		Plasma Arc Cutting (PAC)		Adjust Air/Gas Pressure		Low Air Pressure Light
V	Volts		Increase		No – Do Not Do This		Temperature
	Protective Earth (Ground)		Single Phase		Constant Current		Voltage Input
I	On		Off	%	Percent		Direct Current
U_0	Rated No Load Voltage (Average)	U_1	Primary Voltage	U_2	Conventional Load Voltage		Line Connection
I_{1max}	Rated Maximum Supply Current	I_2	Rated Welding Or Cutting Current	X	Duty Cycle		Single Phase Static Frequency Converter-Transformer-Rectifier
IP	Degree Of Protection		Loose Shield Cup		Input	Hz	Hertz
I_{1eff}	Maximum Effective Supply Current	pf	power factor		Suitable for Some Hazardous Locations	S_1	Power Rating, Product Of Voltage And Current (kVA)

SECTION 4 – INSTALLATION

4-1. Serial Number And Rating Label Location

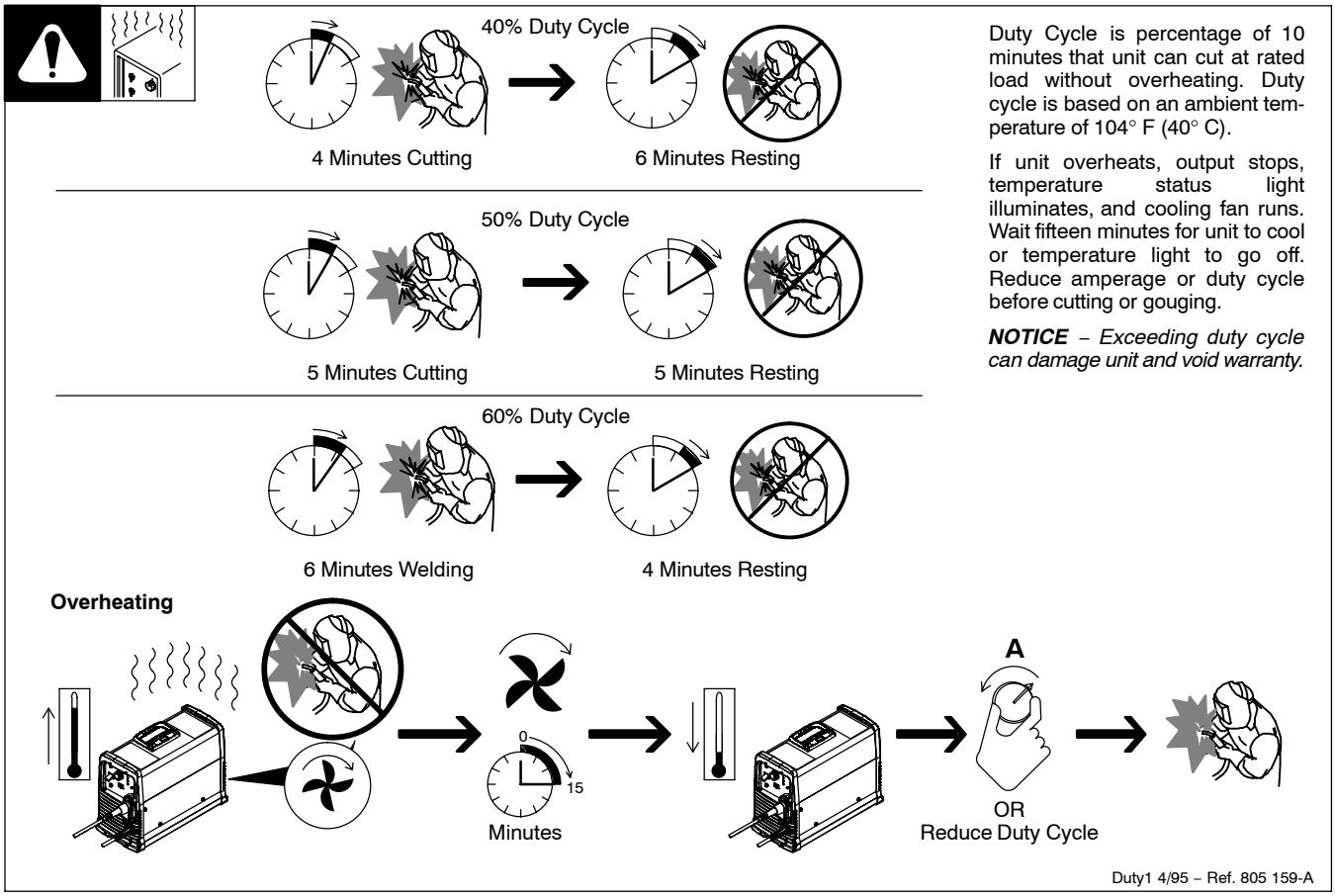
The serial number and rating information for this product is located on the bottom. Use rating label to determine input power requirements and/or rated output. For future reference, write serial number in space provided on back cover of this manual.

4-2. Specifications

Power Supply			
Input			
Rated AC Phase and line frequency (Hz)	1 – 3–Phase	50 / 60 Hz	––
Rated Input Voltage (U1) and rated Input Current (I1) and I1 eff at rated output. I1 eff used to determine power cord rating	**Volts AC RMS – (U1)**	**Amps RMS – (I1)**	**I1 eff**
	208 VAC 1–Phase	47.4	30
	230 VAC 1–Phase	42.2	26.7
	208 VAC 3–Phase	27.5	19.4
	230 VAC 3–Phase	25	17.7
	380 VAC 3–Phase	15	11.6
	460 VAC 3–Phase	12.4	9.6
	575 VAC 3–Phase	9.8	7.6
Power Factor/kVA/kW at Rated Output	**Volts AC RMS – (U1)**	**Power Factor**	**kVA/kW**
	208 VAC 1–Phase	0.98	9.9 / 9.7
	230 VAC 1–Phase	0.98	9.7 / 9.6
	208 VAC 3–Phase	0.95	9.9 / 9.5
	230 VAC 3–Phase	0.95	9.9 / 9.5
	380 VAC 3–Phase	0.95	9.9 / 9.4
	460 VAC 3–Phase	0.95	9.9 / 9.4
	575 VAC 3–Phase	0.95	9.8 / 9.3
Peak kW at Arc Stretch	15.5 kW	––	––
Output			
Rated Open Circuit Voltage (U0) Type	400 Volts DC/Electrode Negative	––	––
Output Characteristic	Constant Current	––	––
Rated Output Current (I2)	60 A	––	––
Rated Output Voltage (U2)	140 Volts DC	––	––
Output Current Range	20 – 60 A	––	––
Duty Cycle at 104°F (40°C) and Rated Conditions (U1, I1, U2, I2) based on a 10 minute period	**Duty Cycle %**	**Amps DC – (I2)**	**Volts AC RMS – (U1)**
	40	60 A	208–230 VAC 1–Phase
	50	60 A	208–230 VAC 3–Phase
	60	60 A	380–575 VAC 3–Phase
	100	50 A	208–230 VAC 1–Phase
	100	50 A	208–575 VAC 3–Phase

General			
Operating Temperature	5° to 104° F (–15° to 40° C)	––	––
IP Code – Degree of protection provided by enclosure	IP23CS	––	––
	IP – International Protection	––	––
	2 – No ingress of foreign objects ≥12.5 mm (0.5 in.)	––	––
	3 – No harmful ingress spraying water	––	––
	C – AC line circuits protected against ingress of tool . 2.5 mm dia x 100 mm long (0.1 in. x 4 in.)	––	––
	S – Fan stationary during water test	––	––
Toppling or tilting	Up to 15° incline	––	––
Gas Type	Air or Nitrogen	––	––
Gas Quality	Clean, moisture–free, oil–free	––	––
Gas Inlet Flow and Pressure	6.75 SCFM (191 L/min)	90 PSI (621 kPa) Min	120 PSI (827 kPa) Max
Gas Filtering	Particulates to 5 microns	––	––
Torch			
Mild Steel capacities (see Section for cutting speeds vs material type and thickness)			
Rated Capacity (edge start)	7/8 in. at 10 ipm (254 mm/min)*	––	––
Sever Cut Capacity (edge start)	1–1/4 in.	––	––
Pierce Capacity	7/16 in.	––	––
*Travel speeds are approximately 80% of maximum.			

4-3. Duty Cycle And Overheating



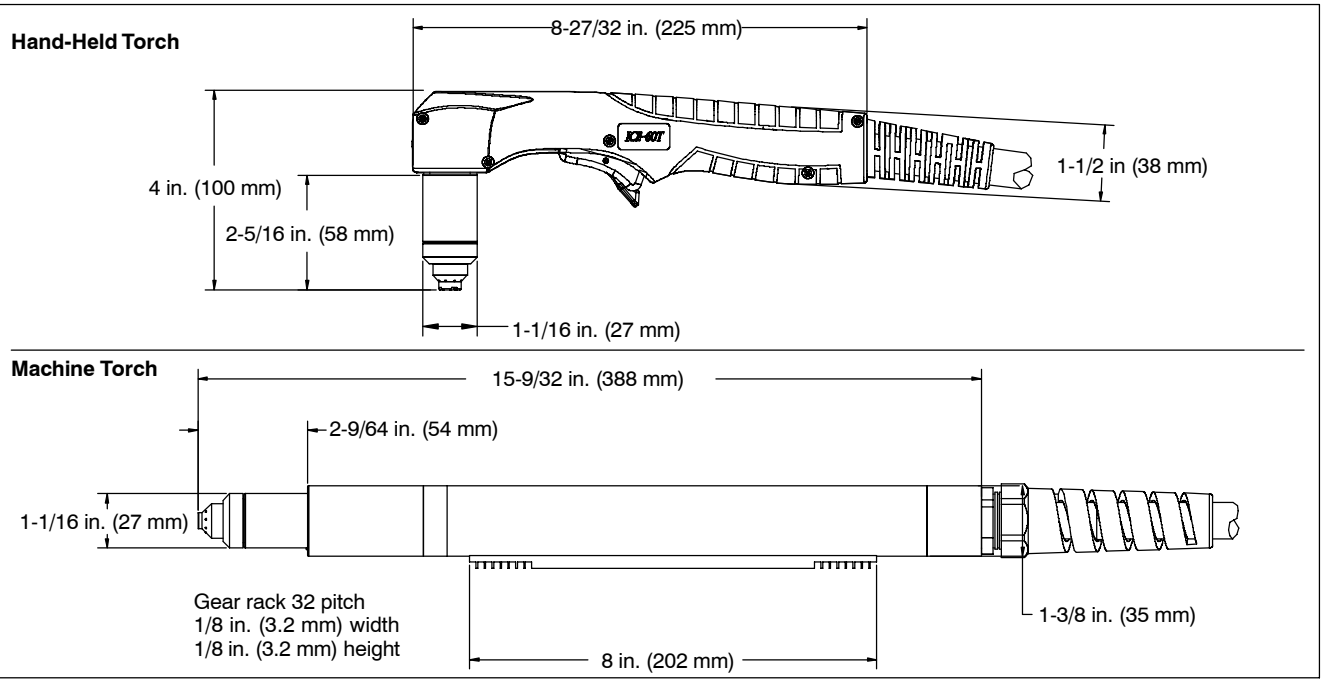
Duty Cycle is percentage of 10 minutes that unit can cut at rated load without overheating. Duty cycle is based on an ambient temperature of 104° F (40° C).

If unit overheats, output stops, temperature status light illuminates, and cooling fan runs. Wait fifteen minutes for unit to cool or temperature light to go off. Reduce amperage or duty cycle before cutting or gouging.

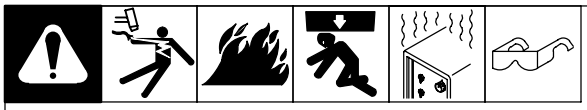
NOTICE *– Exceeding duty cycle can damage unit and void warranty.*

Duty1 4/95 – Ref. 805 159-A

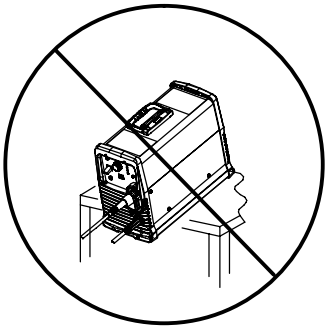
4-4. Torch Dimensions

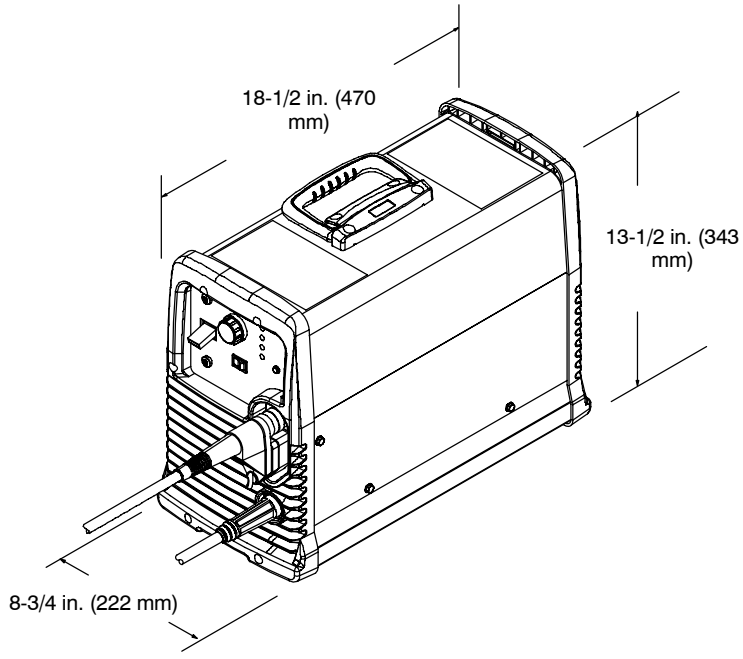


4-5. System Dimensions, Weight, And Movement



Do not move or operate unit where it could tip.





Unit Dimensions And Weight

47 lb (21.3 kg)

Torch Weight

Hand-Held: 20 ft (6.1 m) 6 lb (2.7 kg)

Hand-Held: 50 ft (15.2 m) 12-3/4 lb (5.8 kg)

Machine: 25 ft (7.6 m) 8 lb (3.6 kg)

Machine: 50 ft (15.2 m) 13-1/2 lb (6.1 kg)

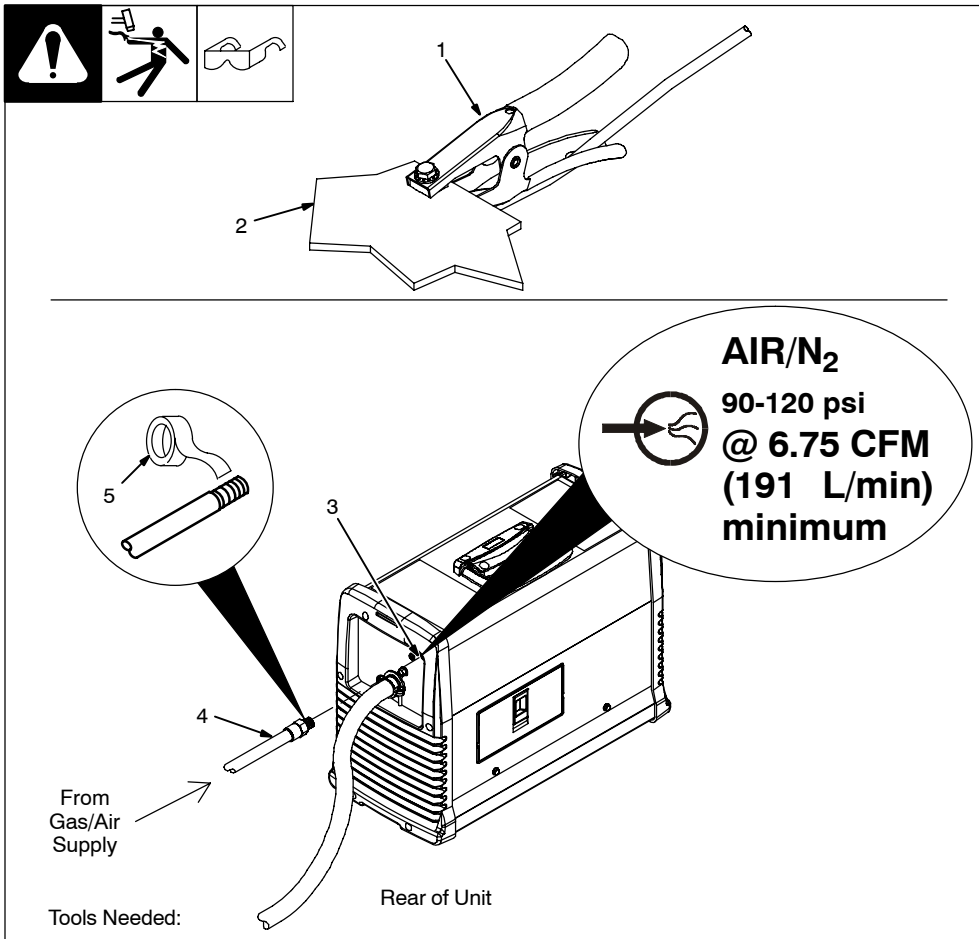
Work Cable Weight

20 ft (6.1 m) 3-1/2 lb (1.6 kg)

50 ft (15.2 m) 7-1/2 lb (3.4 kg)

loc_2 3/96 - Ref. 805 159-A

4-6. Connecting Work Clamp and Gas/Air Supply



Tools Needed:

9/16 in.

1 Work Clamp

2 Workpiece

☞ *Connect work clamp to portion of workpiece that does not fall away after being cut.*

Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

☞ *Use only clean, dry air with 90 to 120 psi (621 to 827 kPa) pressure @ 6.75 CFM (191L/min) minimum.*

☞ *Use filter kit 300 491 or 228 926 where conditions at the work-site allow moisture, oil or other particulates into the air line.*

3 Gas/Air Filter Inlet Opening

4 Hose

☞ *Hose must have a minimum inside diameter of 3/8 in (9.5 mm).*

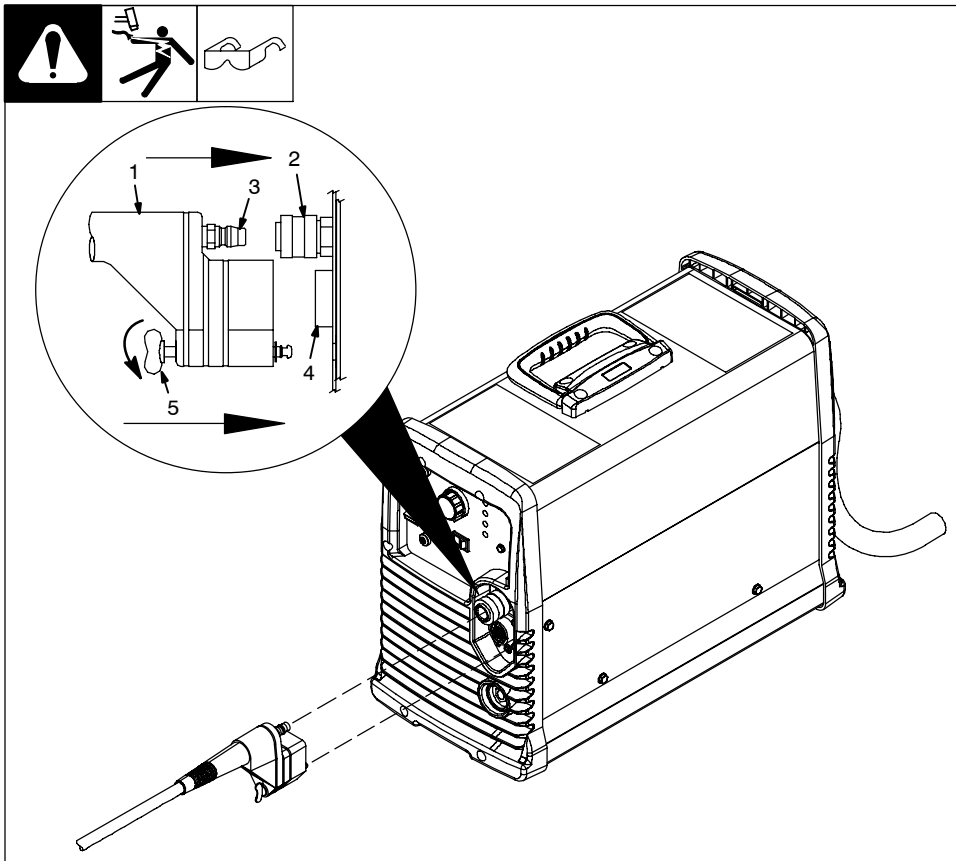
5 Teflon Tape

Obtain hose with 1/4 NPT right-hand thread fitting. Wrap threads with teflon tape (optional) or apply pipe sealant, and install fitting in opening. Route hose to gas/air supply.

NOTICE – *Exceeding input pressure rating of 120 PSI (827 kPa) can damage unit.*

Ref. 803 640-A / Ref. 192 441 / Ref. 805 160-A

4-7. Connecting And Disconnecting Torch



⚠ **Turn off power source and disconnect input power.**

1 Torch Connector
2 Quick Connect Collar
3 Nipple
4 Receptacle
5 Securing Pin

To connect torch:

Push torch connector onto receptacle and quick connect until collar secures nipple.

Rotate securing pin clockwise to lock connector to unit.

To disconnect torch:

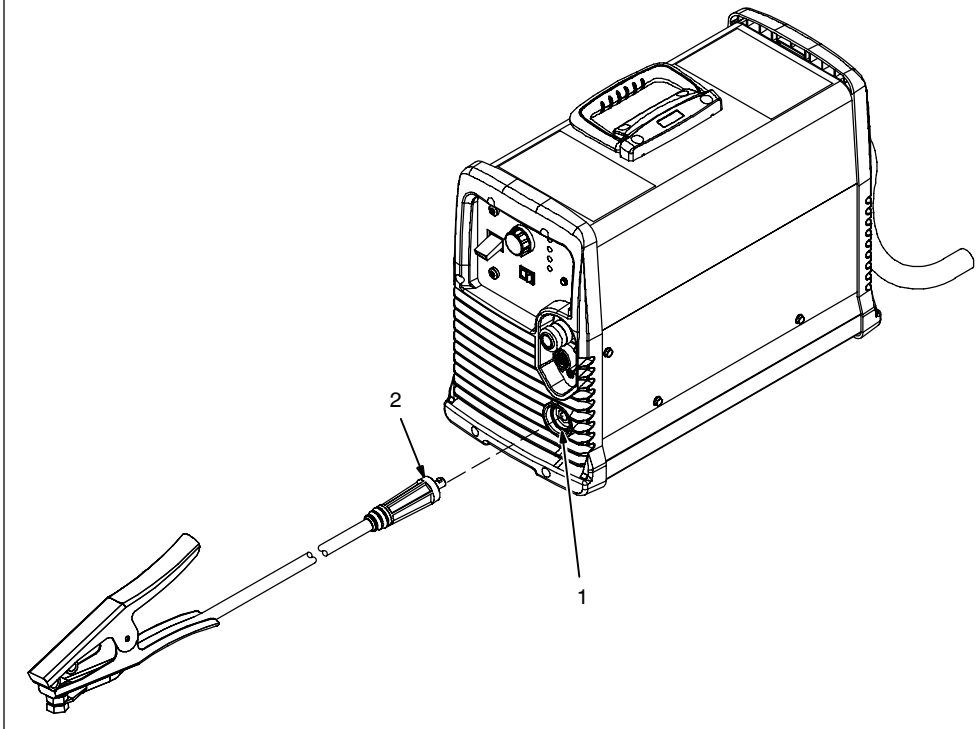
Rotate securing pin counterclockwise to unlock connector from unit.

Push quick connect collar back towards unit to release nipple, and pull torch connector away from unit.

☞ *Use supplied hook and loop strap to manage torch and work cables.*

805 161-A

4-8. Connecting And Disconnecting Work Cable



1 Work Cable Receptacle
2 Work Cable Plug

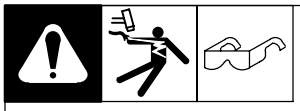
To connect plug, align key with receptacle keyway and insert into receptacle. Rotate plug clockwise (hand tight only) to secure in receptacle.

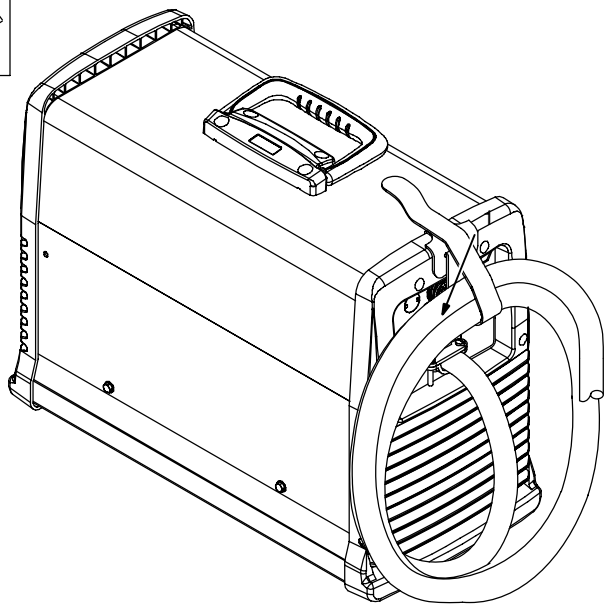
To disconnect plug, rotate counterclockwise until key aligns with keyway and pull plug from receptacle.

☞ *Use supplied hook and loop strap to manage torch and work cables.*

Ref. 805 161-A / Ref. 803 475-G

4-9. Power Cable Management Strap



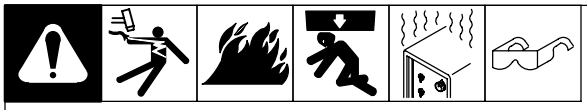


1 Power Cable Management Strap

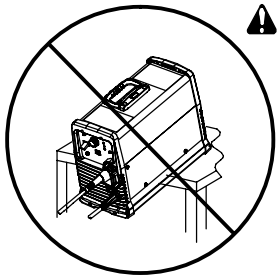
Coil power cable and secure to unit using the power cable management strap.

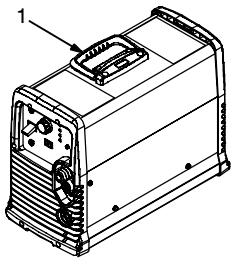
Ref. 805 275-A

4-10. Selecting a Location



⚠ Do not move or operate unit where it could tip.





1 Lifting Handle

Use handle to lift unit.

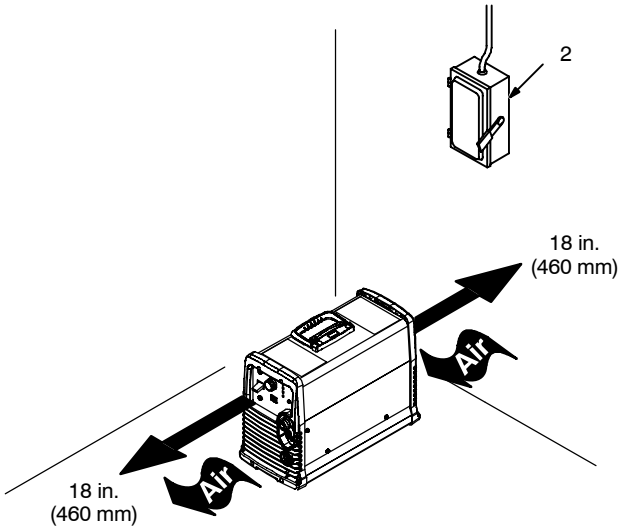
2 Line Disconnect Device

Locate unit near correct input power supply.

Locate unit at least 18 in. (460 mm) away from a wall or other obstuction to allow adequate clearance for cooling air flow.

⚠ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.

Location



loc_2 3/96 - Ref. ST-151 556 / Ref. 805 159

4-11. Electrical Service Guide

NOTICE *– INCORRECT INPUT POWER can damage this welding power source. Phase to ground voltage shall not exceed +10% of rated input voltage.*

☞ *Actual input voltage should not be 10% less than minimum and/or 10% more than maximum input voltages listed in table. If actual input voltage is outside this range, output may not be be available.*

⚠ **Failure to follow these electrical service guide recommendations could create an electric shock or fire hazard. These recommendations are for a dedicated branch circuit sized for the rated output and duty cycle of the welding power source.**

	Single-Phase	
Input Voltage (V)	208	230
Input Amperes (A) At Rated Output	48	42
Max Recommended Standard Fuse Rating In Amperes [1]		
Time-Delay Fuses [2]	50	50
Normal Operating Fuses [3]	70	60
Min Input Conductor Size In AWG/Kcmil [4]	10	10
Max Recommended Input Conductor Length In Feet (Meters)	55 (17)	68 (21)
Min Grounding Conductor Size In AWG/Kcmil [4]	10	10

	Three-Phase				
Input Voltage (V)	208	230	380	460	575
Input Amperes (A) At Rated Output	27	25	15	12	10
Max Recommended Standard Fuse Rating In Amperes [1]					
Time-Delay Fuses [2]	30	30	15	15	10
Normal Operating Fuses [3]	40	35	20	20	15
Min Input Conductor Size In AWG/Kcmil [4]	12	12	14	14	14
Max Recommended Input Conductor Length In Feet (Meters)	68 (21)	83 (25)	148 (45)	216 (66)	341 (104)
Min Grounding Conductor Size In AWG/Kcmil [4]	12	12	14	14	14

Reference: 2008 National Electrical Code (NEC) (including article 630)

1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.

2 “Time-Delay” fuses are UL class “RK5” . See UL 248.

3 “Normal Operating” (general purpose - no intentional delay) fuses are UL class “K5” (up to and including 60 amps), and UL class “H” (65 amps and above).

4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

4-12. Extension Cord Data

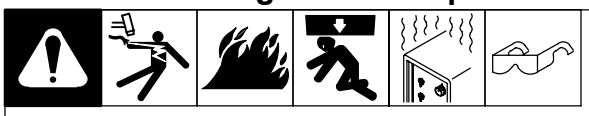
☞ *When calculating max. cord length, remember to include conductor length from line disconnect device to input power receptacle.*

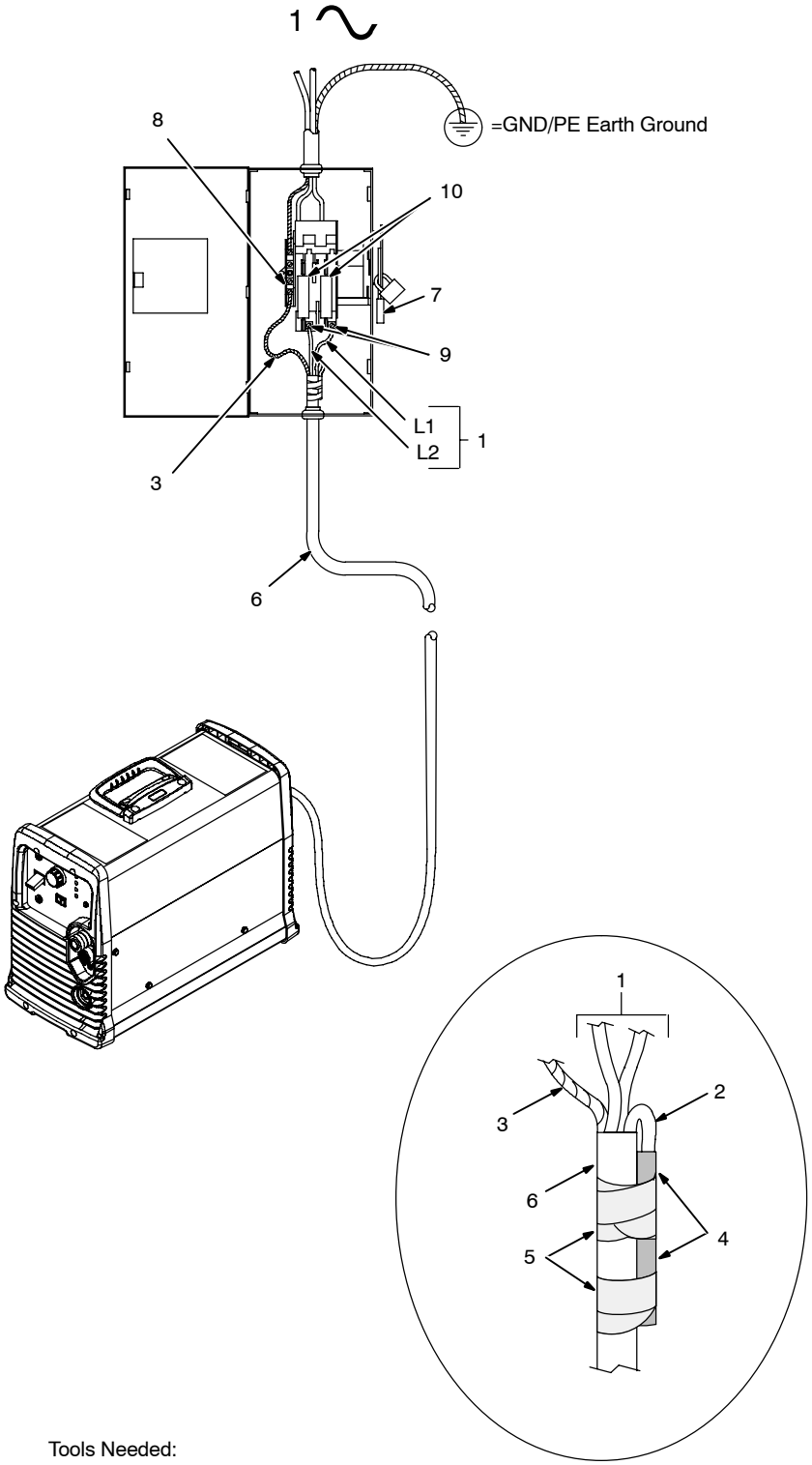
Input Voltage	Input Power Phase	Hertz	Fuse Size Or Circuit Breaker Rating		Conductor Size	Max. Cord Length
208 V	1	50/60	**Time-Delay [2]** **Normal Operating [3]**	50 A 70 A	10 AWG	55 ft (17 m)
230 V	1	50/60	**Time-Delay [2]** **Normal Operating [3]**	50 A 60 A	10 AWG	67 ft (21 m)
208 V	3	50/60	**Time-Delay [2]** **Normal Operating [3]**	30 A 40 A	12 AWG	68 ft (21 m)
230 V	3	50/60	**Time-Delay [2]** **Normal Operating [3]**	30 A 35 A	12 AWG	83 ft (25 m)
380 V	3	50/60	**Time-Delay [2]** **Normal Operating [3]**	15 A 20 A	14 AWG	148 ft (45 m)
460 V	3	50/60	**Time-Delay [2]** **Normal Operating [3]**	15 A 20 A	14 AWG	216 ft (66 m)
575 V	3	50/60	**Time-Delay [2]** **Normal Operating [3]**	10 A 15 A	14 AWG	341 ft (104 m)

2 “Time-Delay” fuses are UL class “RK5” .
3 “Normal Operating” (general purpose – no intentional delay) fuses are UL class “K5” (up to and including 60 amp), and UL class “H” (65 amp and above).

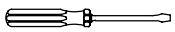
Notes

4-13. Connecting 1-Phase Input Power





Tools Needed:



⚠ Installation must meet all National and Local Codes – have only qualified persons make this installation.

⚠ Disconnect and lockout/tagout input power before connecting input conductors from unit.

⚠ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

NOTICE *– The Auto-Line circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to any input power between 208 and 230 VAC without removing cover to relink the power source.*

1 Black And White Input Conductor (L1 And L2)

2 Red Input Conductor

3 Green Or Green/Yellow Grounding Conductor

4 Insulation Sleeving

5 Electrical Tape

Insulate and isolate red conductor as shown.

6 Input Power Cord.

7 Disconnect Device (switch shown in the OFF position)

8 Disconnect Device Grounding Terminal

9 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1 and L2 to disconnect device line terminals.

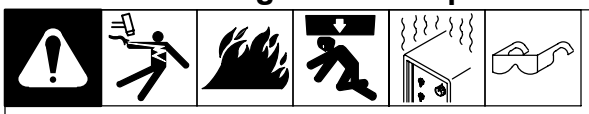
10 Over-Current Protection

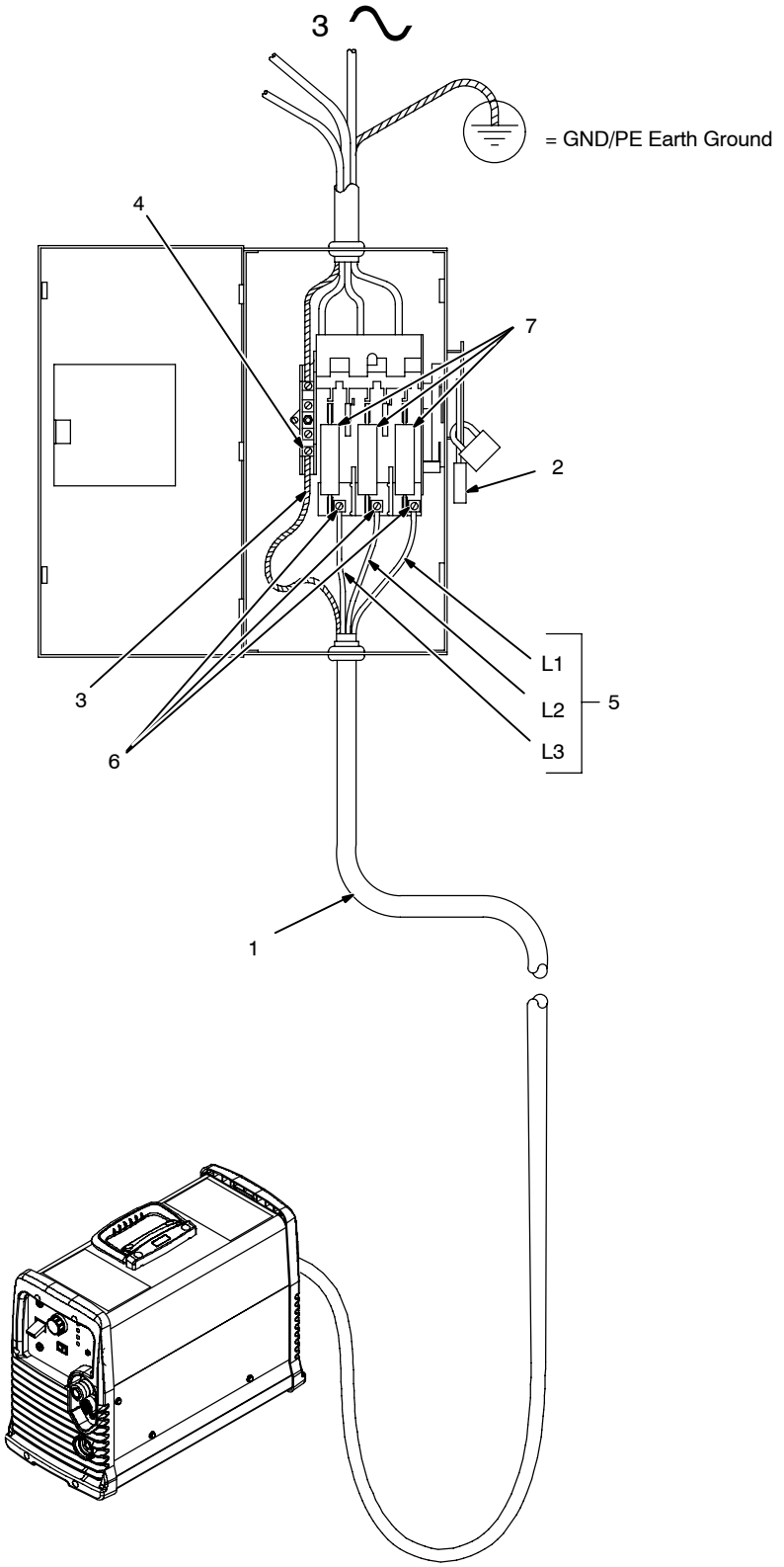
Select type and size of over-current protection using Section 4-11 (fused disconnect switch shown).

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

input1 20008–01 – 803 766-C / 805 159

4-14. Connecting 3-Phase Input Power





⚠ Installation must meet all National and Local Codes – have only qualified persons make this installation.

⚠ Disconnect and lockout/tagout input power before connecting input conductors from unit.

⚠ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

NOTICE *– The Auto-Line circuitry in this unit automatically adapts the power source to the primary voltage being applied. Check input voltage available at site. This unit can be connected to any input power between 208 and 575 VAC without removing cover to relink the power source.*

For Three-Phase Operation

1 Input Power Cord.

2 Disconnect Device (switch shown in the OFF position)

3 Green Or Green/Yellow Grounding Conductor

4 Disconnect Device Grounding Terminal

5 Input Conductors (L1, L2 And L3)

6 Disconnect Device Line Terminals

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

Connect input conductors L1, L2, and L3 to disconnect device line terminals.

7 Over-Current Protection

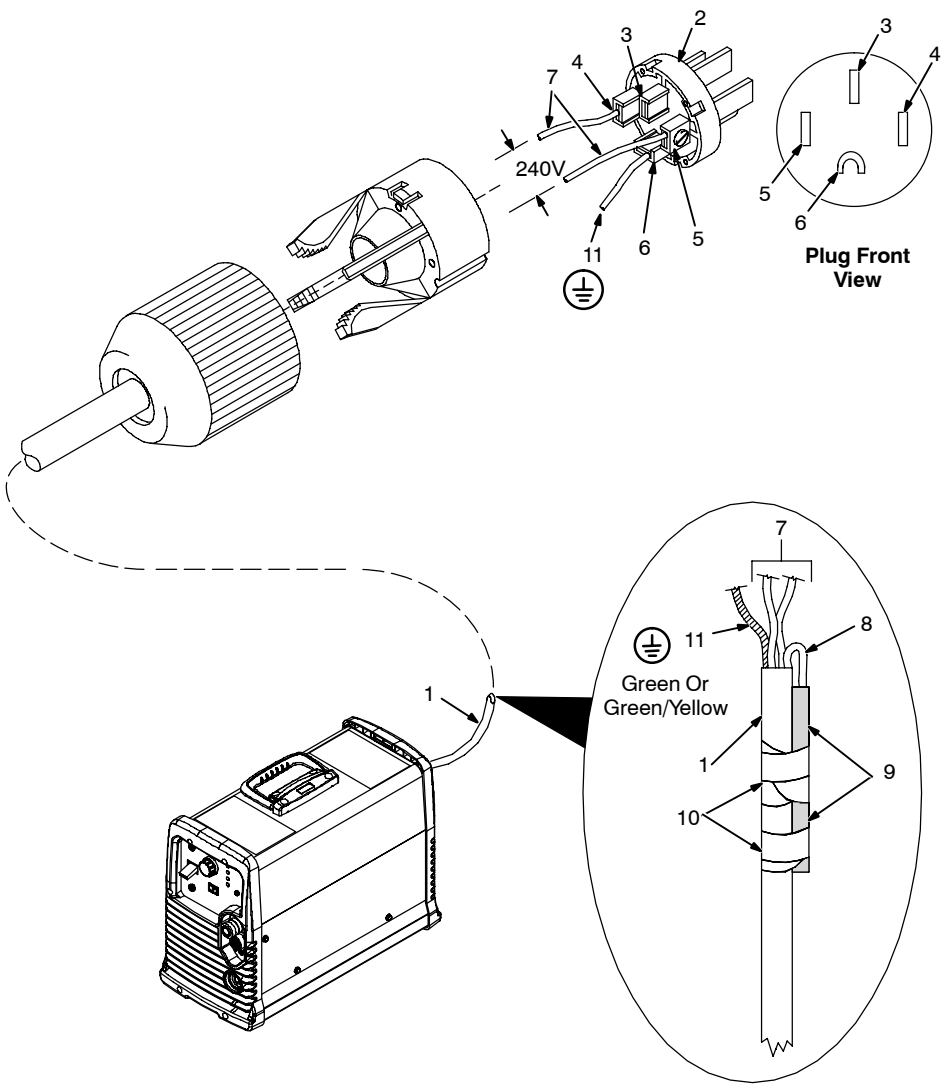
Select type and size of over-current protection using Section 4-11 (fused disconnect switch shown).

Close and secure door on disconnect device. Remove lockout/tagout device, and place switch in the On position.

Tools Needed:

input2 2008–01 – 803 766-C / 805 159

4-15. Wiring Optional 240 Volt Plug (119 172) For Connection To Miller Bobcat, Trailblazer Or Hobart Champion 10,000



Check input voltage available at the power supply.

☞ *The Auto-Line ™ circuitry in this unit automatically adapts the power source to the 240 volts, single-phase, 50 or 60 Hz primary voltage from the power supply.*

1 Input And Grounding Conductors

2 Plug Wired for 240 V, 2-Wire Load

3 Neutral (Brass) Terminal And Prong **(Not Used)**

4 Load 1 (Brass)Terminal And Prong

5 Load 2 (Brass) Terminal And Prong

6 Ground (Brass) Terminal And Prong

7 Black And White Input Conductors

8 Red Input Conductor

9 Insulation Sleeving

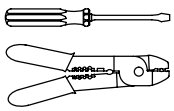
10 Electrical Tape

11 Green Or Green/Yellow Ground Conductor

Insulate and isolate red conductor as shown.

Always connect green or green/yellow wire to ground terminal, never to a load terminal. Connect black (L1) and white (L2) wires to load terminals.

Tools Needed:

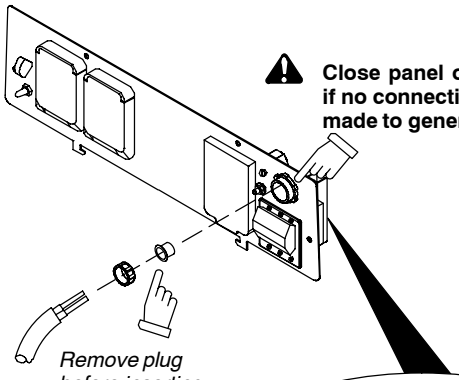


3/16 in.

Ref. 120 813-D / Ref. 805 161-A

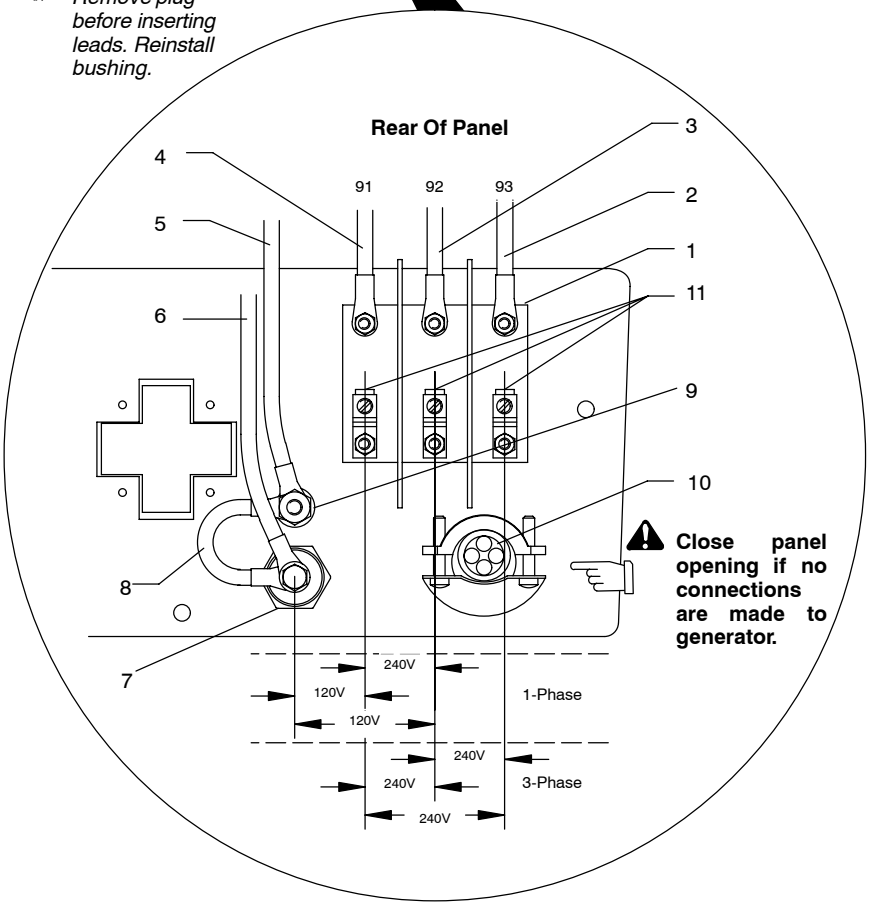
4-16. Connecting To Miller Welder/Generator With A Three-Phase AC Power Plant

Three-Phase Power Connection



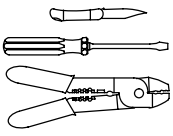
Close panel opening if no connections are made to generator.

Remove plug before inserting leads. Reinstall bushing.

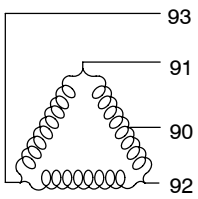


Close panel opening if no connections are made to generator.

Tools Needed:



AC ∼ Output	Single Phase 1 ∼	Three Phase 3 ∼
Volts	120/240	240
Amps	50	48
KVA/KW	12	20
Frequency	60 Hz	
Engine Speed	1850 RPM	
Lead 42 connects to GROUND stud on front of unit. Jumper 42 is connected to 90 at factory.		



Three-Phase Generator Power

Stop engine.

Power and weld outputs are live at the same time. Disconnect or insulate unused cables.

☞ *Have qualified person install according to circuit diagram and Generator Power Guidelines (see generator Owner's Manual).*

Remove generator power panel mounting screws. Tilt panel forward.

1 Circuit Breaker CB7

2 Lead 93

3 Lead 92

4 Lead 91

5 Lead 42 (Circuit Grounding Lead)

6 Lead 90 (Neutral)

7 Isolated Neutral Terminal

8 Jumper Lead 42

9 Grounding Terminal

Jumper 42 is connected to lead 90 at factory. Jumper 42 may be disconnected from neutral to meet applicable electrical codes.

Lead 42 connects to front panel Ground stud.

10 Power Cord

11 Circuit Breaker CB7 User Terminals

☞ *Circuit breaker CB7 protects single-phase receptacle RC5 and the load wires from overload. If CB7 opens, all three-phase generator output stops and the receptacle does not work.*

Connect user-supplied ring lug to green (ground) lead. Connect ring lug on end of green (ground) lead to grounding terminal (9).

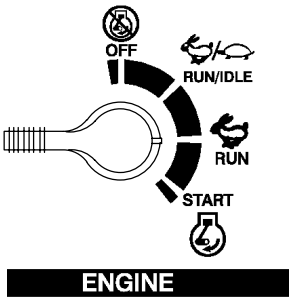
Connect black, white, and red leads to circuit breaker CB7 user terminals (11).

Reinstall power panel.

Ref. 197 399 / 802 332-B

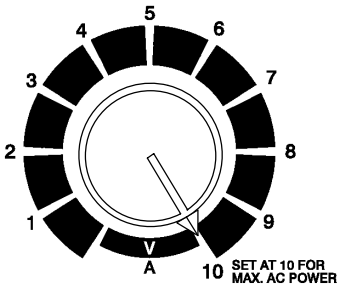
4-17. Generator Settings For Plasma Cutter Operation

⚠ **Engine Control Switch must be set at "RUN" position – not "RUN/IDLE".**



ENGINE

⚠ **Set generator Fine Adjustment Control to 10 for maximum auxiliary power, if applicable.**



FINE ADJUST

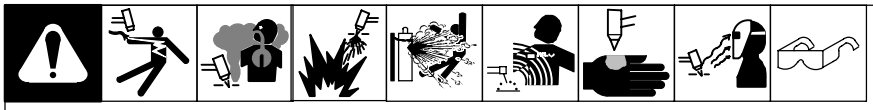
☞ *The peak kW at arc stretch of this plasma power source is 15.5 kW. Reducing output to 45 amps may be necessary to operate the unit using a 10 kW generator.*

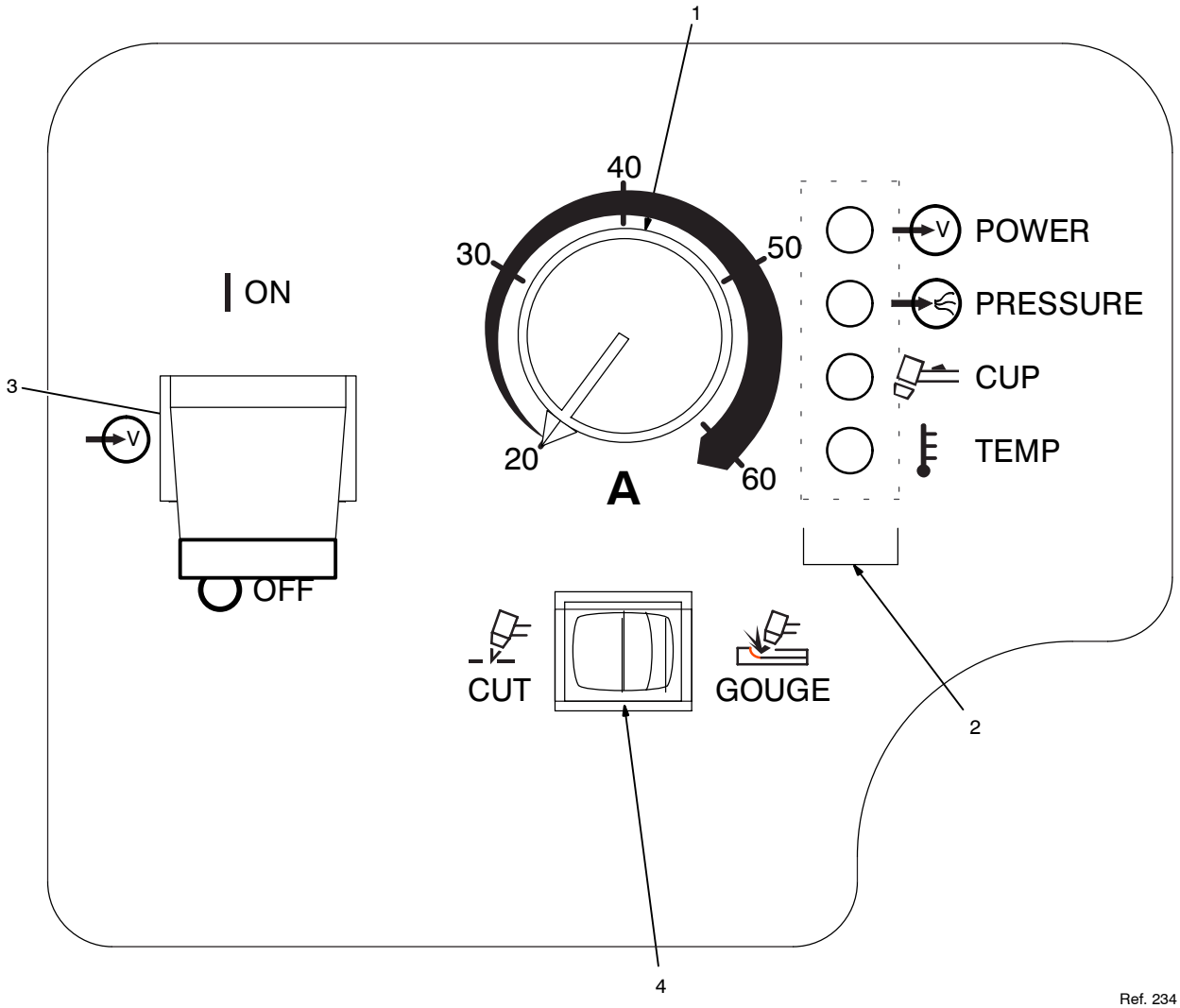
Ref. 803 222

Notes

SECTION 5 – OPERATION

5-1. Controls





Ref. 234 155-A

1 Output Control

Use control to set cutting output.

2 Status Lights (See Section 7-6)

3 Power Switch

☞ *The fan will operate for approximately 10 seconds after power switch is placed in the Off position to reduce DC bus voltage.*

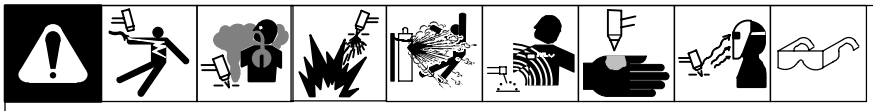
4 Cut/Gouge Switch

Place switch in appropriate position for desired process. Unit will automatically regulate pressure to 70 psi (483 kPa) for cutting and 60 psi (413 kPa) for gouging. Pilot current is automatically increased in gouge mode to provide better gouging starts.

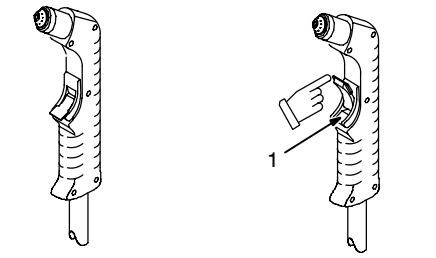
☞ *Use only clean, dry air with 90 to 120 psi (621 to 827 kPa) pressure. Prevent moisture from entering air supply at extreme cold temperatures.*

☞ *Use filter kit 300 491 or 228 926 where conditions at the worksite allow moisture, oil or other particulates into the air line.*

5-2. Trigger Safety Lock



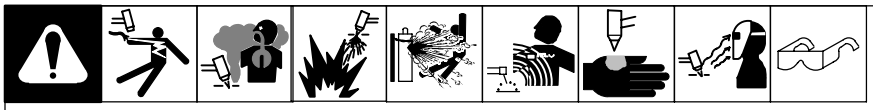
1 Trigger



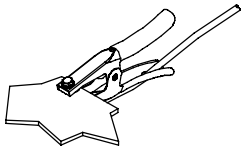
Trigger Locked Trigger Unlocked

801 397-A

5-3. Plasma Cutting System Practices

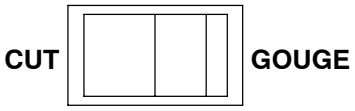


The pilot arc starts immediately when trigger is pressed.

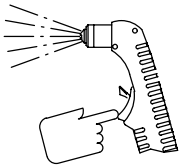


Always connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

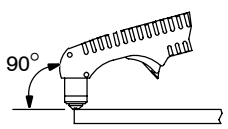
☞ *Connect work clamp to portion of workpiece that does not fall away after being cut.*



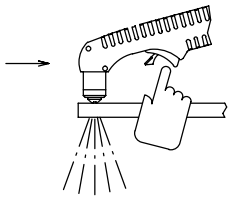
☞ *Set switch to either cut or gouge depending on desired process.*



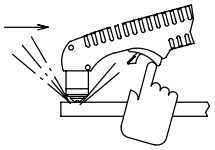
DO NOT start pilot arc without cutting or gouging as this shortens the service life of the nozzle and electrode.



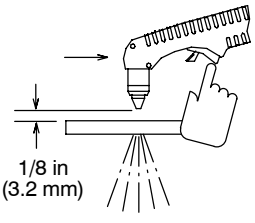
Maintain approximately a 90° angle to the workpiece surface for proper cutting results.



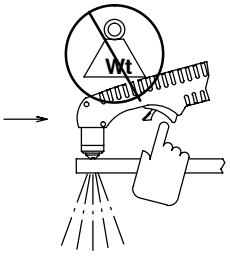
Sparks should pass through the workpiece and out the bottom when cutting.



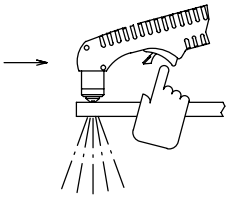
If sparks flare back from surface, this usually is an indication that either travel speed is too fast or amperage is set too low.



When doing **extended (non-shielded)** cutting, maintain approximately 1/8 in standoff between tip and surface.



DO NOT put pressure on shield when **drag cutting**; instead, slide shield along the surface for proper cutting results.

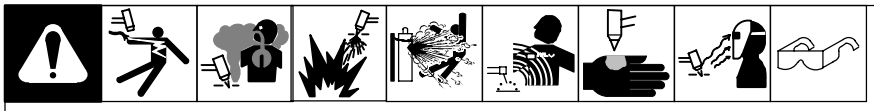


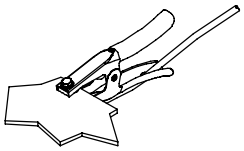
Pulling rather than pushing the torch makes cutting easier. Use a proper guide or template for accurate cutting operations.

☞ *For more information, go to MillerWelds.com.*

Ref. 803 640-A / 801 400-B / Ref. 802 878

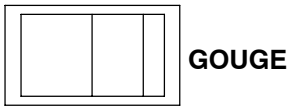
5-4. Sequence Of Cutting Operation





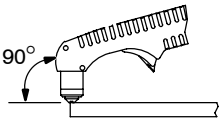
Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

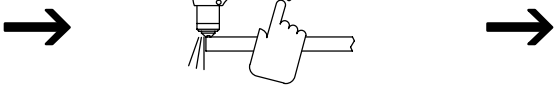
☞ *Connect work clamp to portion of workpiece that does not fall away after being cut.*



☞ *Unit automatically regulates pressure to 70 psi (483 kPa) for cutting.*

⚠ **The pilot arc starts immediately when trigger is pressed.**

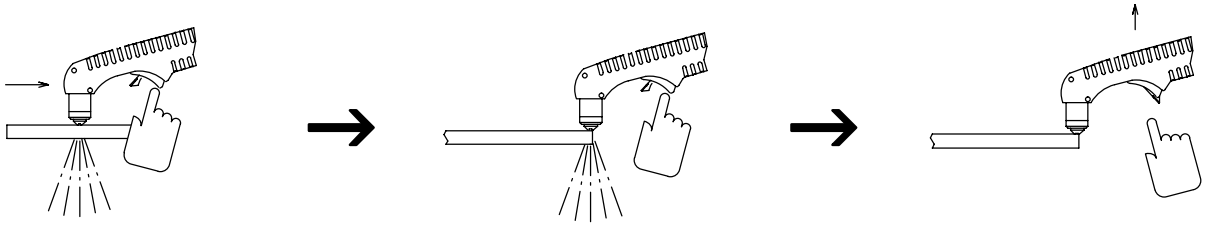




For standard (shielded) cutting, place drag shield on edge of metal. For **extended (non-shielded)** cutting, use 1/8 in (3.2 mm) standoff distance (dragging tip will reduce tip life).

Raise trigger lock and press trigger. Pilot arc starts and will go out after 3 seconds if cutting arc is not established.

After cutting arc starts, slowly start moving torch across metal.



Adjust torch speed so sparks go thru metal and out bottom of cut.

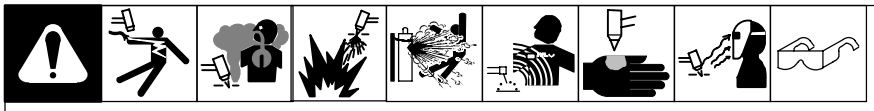
Pause briefly at end of cut before releasing trigger.

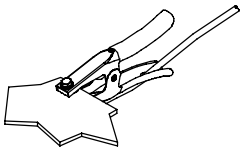
Postflow continues after releasing trigger; cutting arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

☞ *For more information, go to MillerWelds.com.*

Ref. 803 640-A / 801 400-B

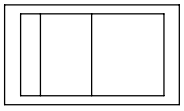
5-5. Sequence Of Gouging Operation





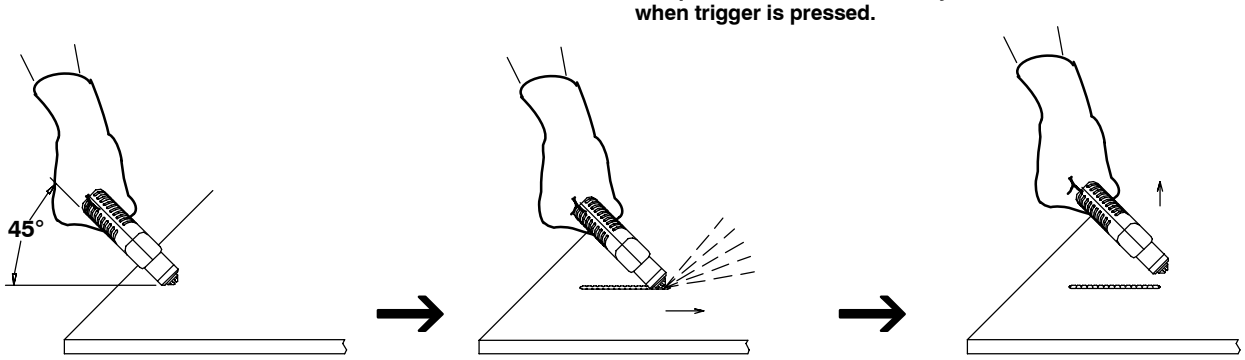
Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

☞ *Connect work clamp to portion of workpiece that does not fall away after being cut.*



☞ *Unit automatically regulates pressure to 60 psi (413 kPa) for gouging.*

⚠ **The pilot arc starts immediately when trigger is pressed.**



Hold torch at approximately 45° angle to workpiece.

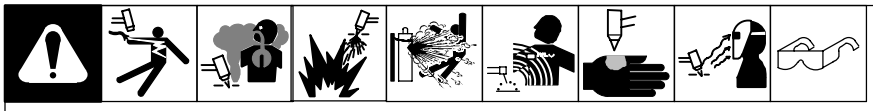
Raise trigger lock and press trigger. Pilot arc starts and will go out after 3 seconds if gouging arc is not established. Move tip to within approximately 3/16 in (4.8 mm). Start gouging across workpiece surface. Maintain approximately a 45° angle to surface.

Release trigger. Postflow continues after releasing trigger; arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

☞ *For more information, go to MillerWelds.com.*

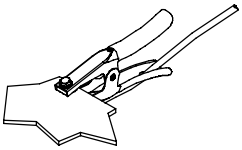
Ref. 803 640-A / 801 400-B

5-6. Sequence Of Piercing Operation



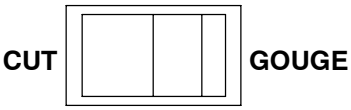
⚠ The pilot arc starts immediately when trigger is pressed.

☞ *Recommended maximum piercing capacity is 7/16 in (11 mm).*

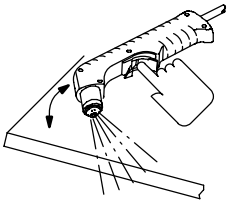


Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

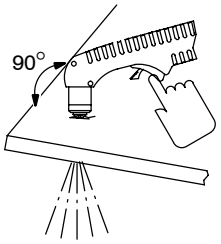
☞ *Connect work clamp to portion of workpiece that does not fall away after being cut.*



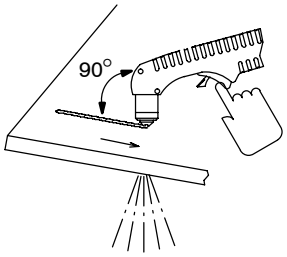
☞ *Unit automatically regulates pressure to 70 psi (483 kPa) for cutting.*



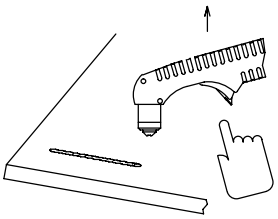
Hold torch at an angle to the workpiece. Raise trigger lock and press trigger. Pilot arc starts and will go out after 3 seconds if cutting arc is not established.



Rotate torch to upright position approximately 90° to surface. When arc has pierced through workpiece, start cutting.



Maintain approximately 90° torch position to surface, and continue cutting.



Release trigger. Postflow continues after releasing trigger; arc can be instantly restarted during postflow by raising trigger lock and pressing trigger.

☞ *For more information, go to MillerWelds.com.*

Ref. 803 640-A / 801 400-B

5-7. Cutting Speed

Mild Steel

Arc Current	Material Thickness		Recommended Cut Speeds	
	Inches	mm	IPM	mm/min
60	1/4	6.4	86	2184
	3/8	9.5	41	1041
	1/2	12.7	27	686
	5/8	15.9	20	512
	3/4	19.1	14	363
	7/8	22.2	10	254

Stainless

Arc Current	Material Thickness		Recommended Cut Speeds	
	Inches	mm	IPM	mm/min
60	1/4	6.4	72	1829
	3/8	9.5	34	864
	1/2	12.7	23	584
	5/8	15.9	17	429
	3/4	19.0	12	297
	7/8	22.2	9	222

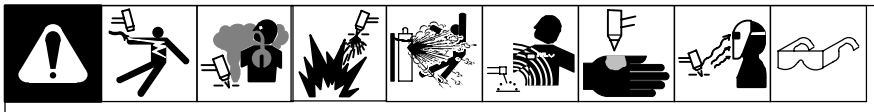
Aluminum

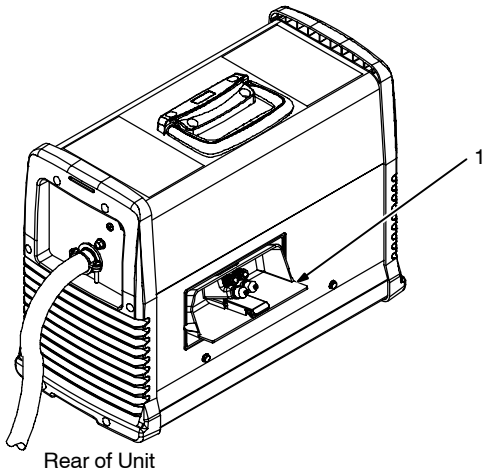
Arc Current	Material Thickness		Recommended Cut Speeds	
	Inches	mm	IPM	mm/min
60	1/4	6.4	94	2388
	3/8	9.5	48	1219
	1/2	12.7	30	762
	5/8	15.9	21	545

☞ *Recommended cut speed is approximately 80% of maximum.*

☞ *Recommended maximum piercing capacity is 7/16 in (11 mm).*

5-8. Consumables Storage Compartment





Rear of Unit

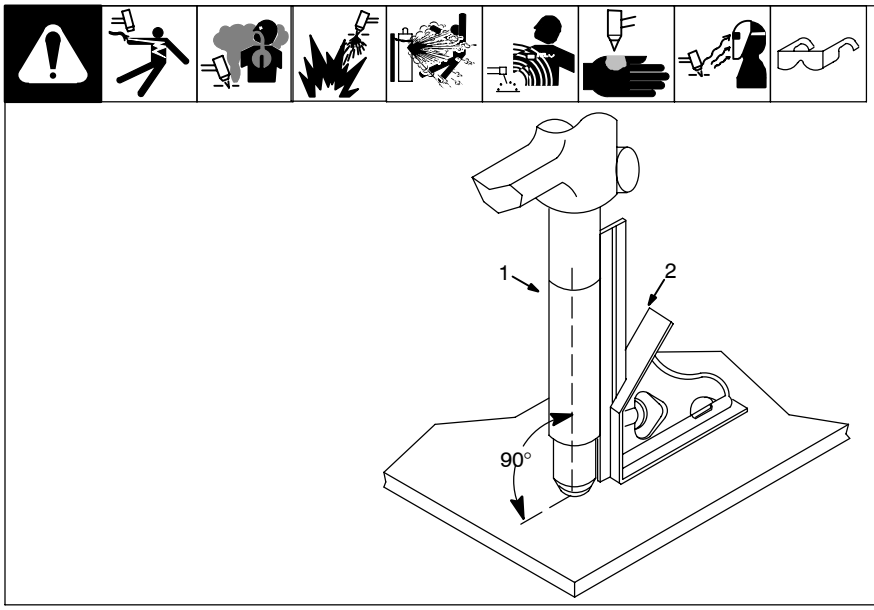
1 Consumables Storage Compartment

This compartment provides convenient access to consumables and parts.

Ref. 805 160-A

SECTION 6 – MECHANIZED OPERATION

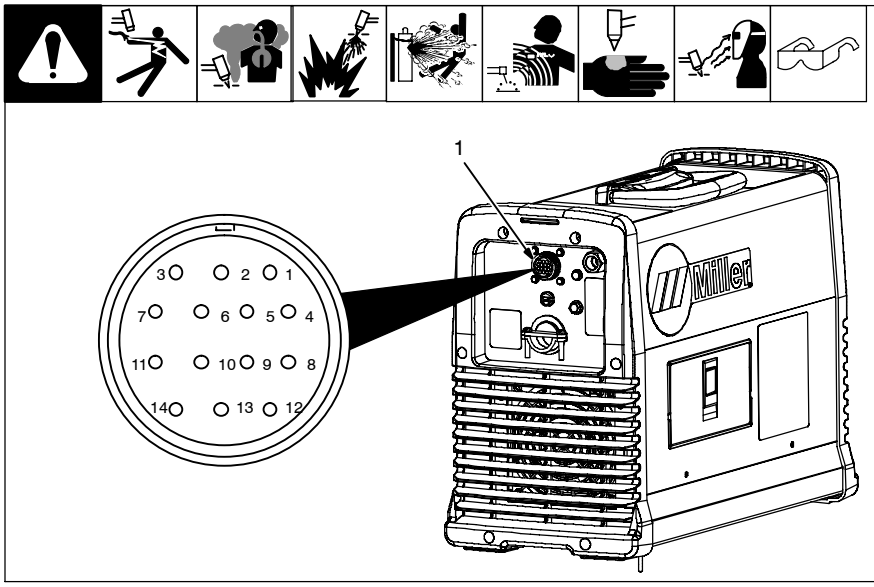
6-1. ICE-60TM Mounting Position



1 ICE-60TM Machine Torch
2 Square

Use a square to align torch perpendicular to the work surface.

6-2. Remote Control Receptacle



☞ *Remote trigger will only operate with a machine torch installed. Remote trigger is disabled when a handheld torch is installed.*

1 Remote Control Receptacle RC61

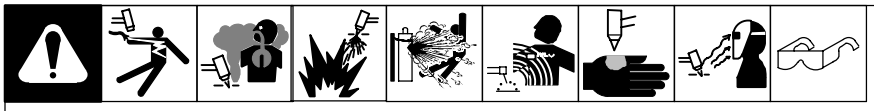
RC61 provides remote arc start inputs when using the ICE-60TM machine torch. Connect supplied remote control cable or remote pendant control to receptacle on rear panel. See Section 6-3 for remote control cable input and output functions.

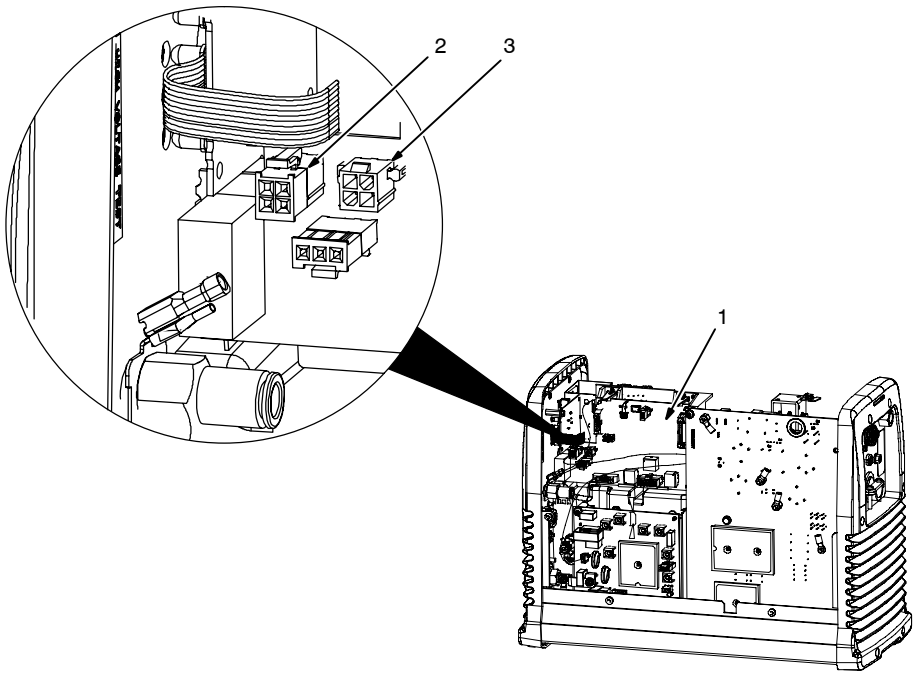
243 336-A

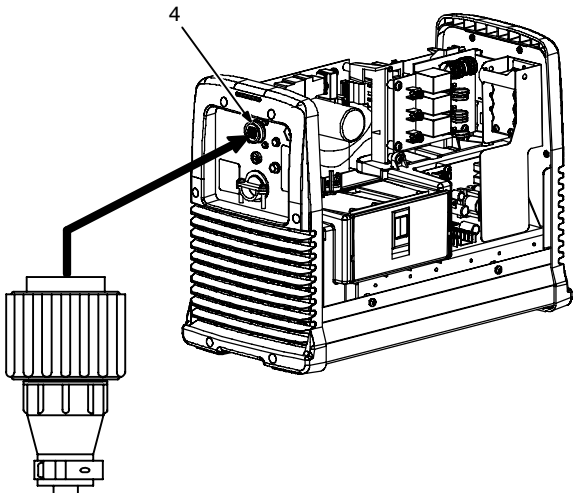
6-3. Remote Control Cable Functions

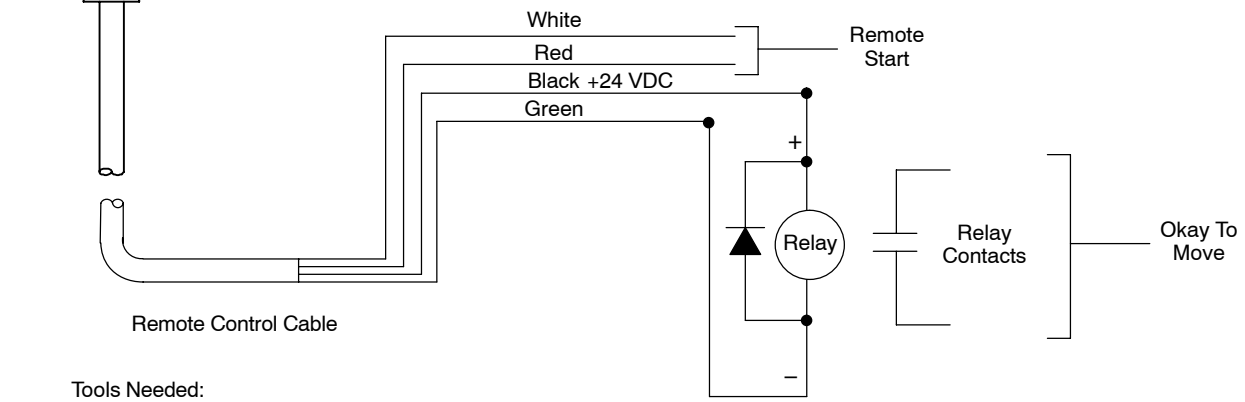
Function	Lead	Socket	Lead Information
Remote Start	White	1	White and red leads connect to a set of customer-supplied remote contacts to provide a remote trigger input signal to RC61 sockets 1 and 5 for the remote start function.
	Red	5	
Okay To Move	Black	2	Black and green leads connect to a customer-supplied machine torch drive device. Normally open contacts close after arc start to provide an output signal to begin machine torch movement. These contacts can be either dry (RMT1) or hot [RMT2 (+24 volts dc)] depending on plug position at RMT1 or RMT2 receptacle on Control board PC1. NOTE: The Spectrum 875 Auto-Line with factory-installed machine torch is shipped from the factory with the plug connected to RMT1 (dry contacts). To power a relay or isolated input module with +24 volts DC on black lead (socket 2) and circuit common on green lead (socket 4), see Section 6-4 or 6-5.
	Green	4	
Noise Suppression	Shielding	3	Chassis ground.

6-4. +24 Volts DC Hot Contacts For Relay Operation









Tools Needed:

Torx 25

Turn off power source and disconnect input power.

Remove wrapper (see Section 7-4).

Control board PC1 can supply +24 volts DC from receptacle RMT2 to operate a customer-supplied relay for the Okay To Move signal.

1 Control Board PC1
2 Receptacle RMT1
3 Receptacle RMT2
4 Receptacle RC61

Move plug from RMT1 into receptacle RMT2 on PC1. Be sure remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

Required Items:

Customer-supplied 24 volts DC relay coil with resistance greater than 240 ohms.

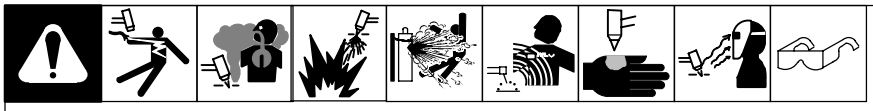
Suppression diode (1A, 100V) such as type IN4002 through IN4004 across relay coil.

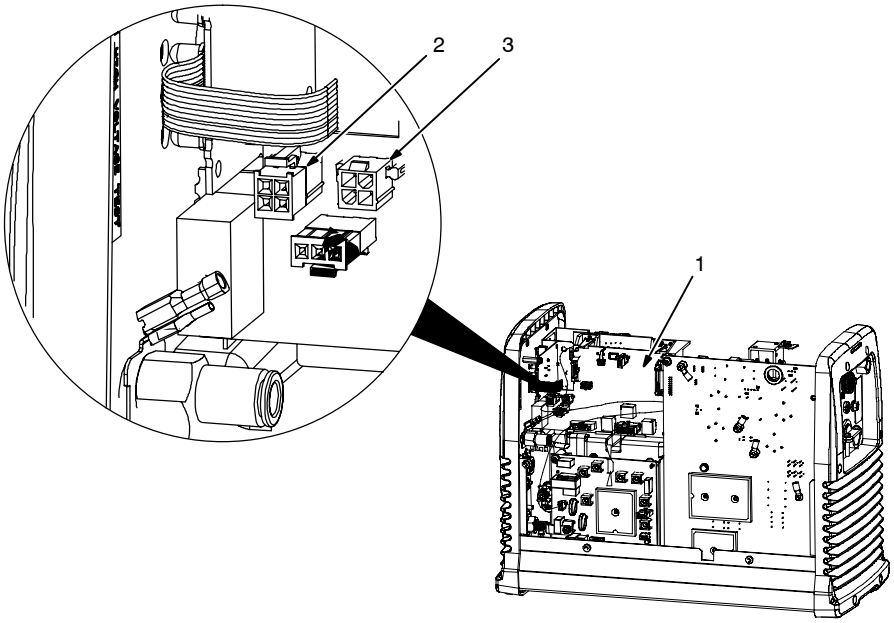
☞ *Machine torch equipped plasma cutter is shipped from the factory with plug connected to receptacle RMT1 (dry contacts).*

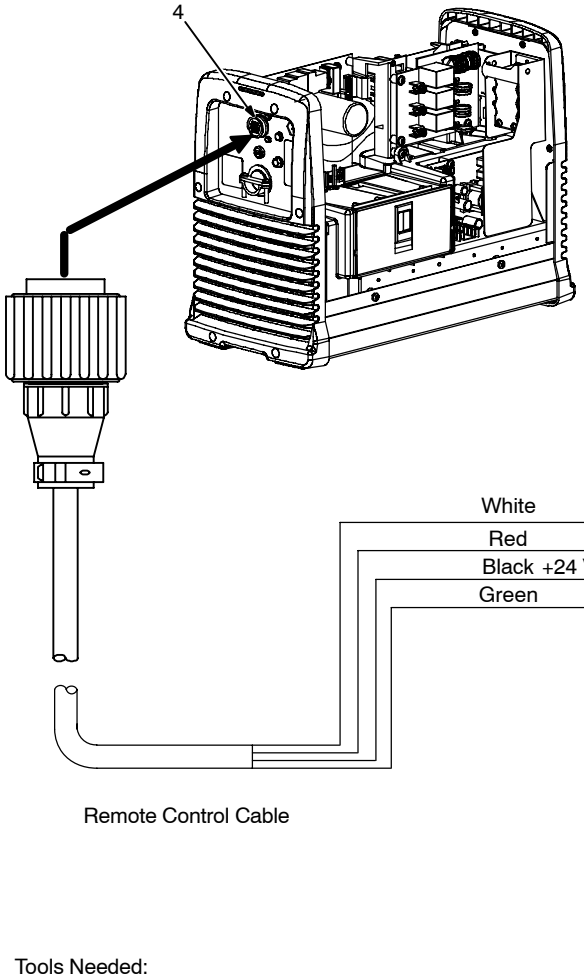
☞ *+24 volts DC will activate relay coil after unit is triggered and the cutting arc is initiated.*

243 336-A / 804 041-A

6-5. +24 Volts DC Hot Contacts For Isolated Input Module Operation







Tools Needed:

Torx 25

Turn off power source and disconnect input power.

Remove wrapper (see Section 7-4).

Control board PC1 can supply +24 volts DC from receptacle RMT2 to operate a customer-supplied isolated input module for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT1

3 Receptacle RMT2

4 Receptacle RC61

Move plug from RMT1 into receptacle RMT2 on PC1. Be sure remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

Required Items:

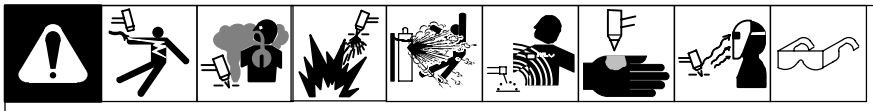
Customer-supplied isolated input module.

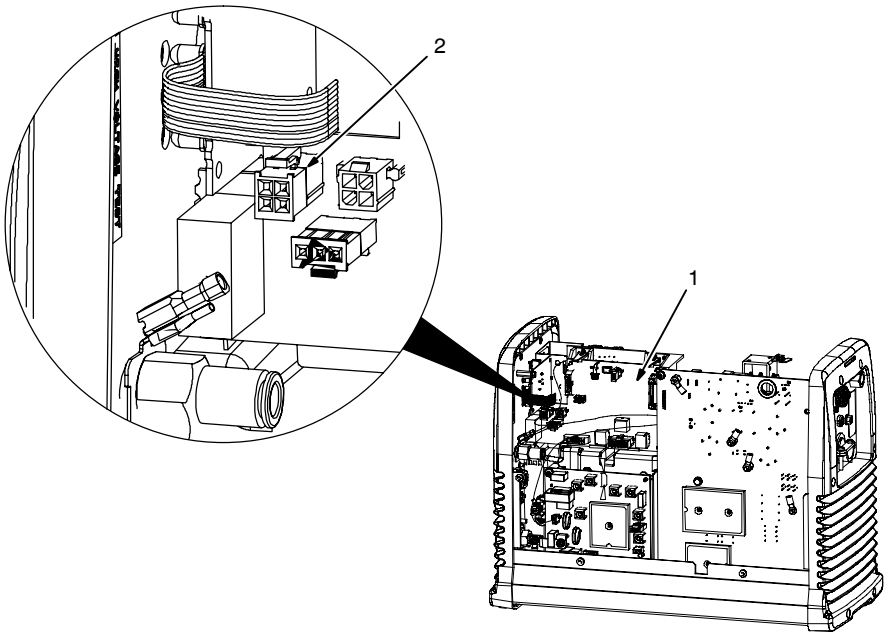
☞ *Machine torch equipped plasma cutter is shipped from the factory with plug connected to receptacle RMT1 (dry contacts).*

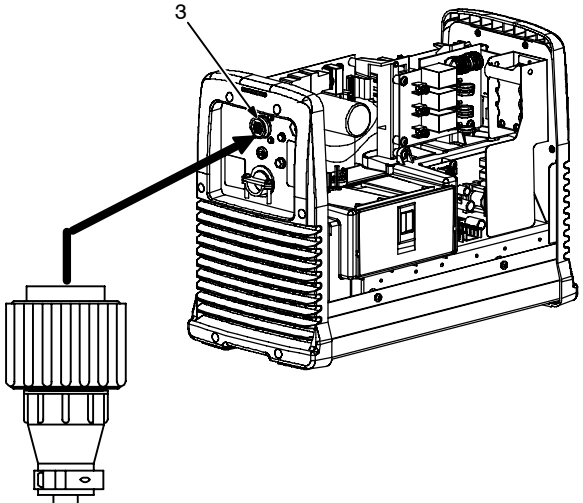
☞ *+24 volts DC will activate relay coil after unit is triggered and the cutting arc is initiated.*

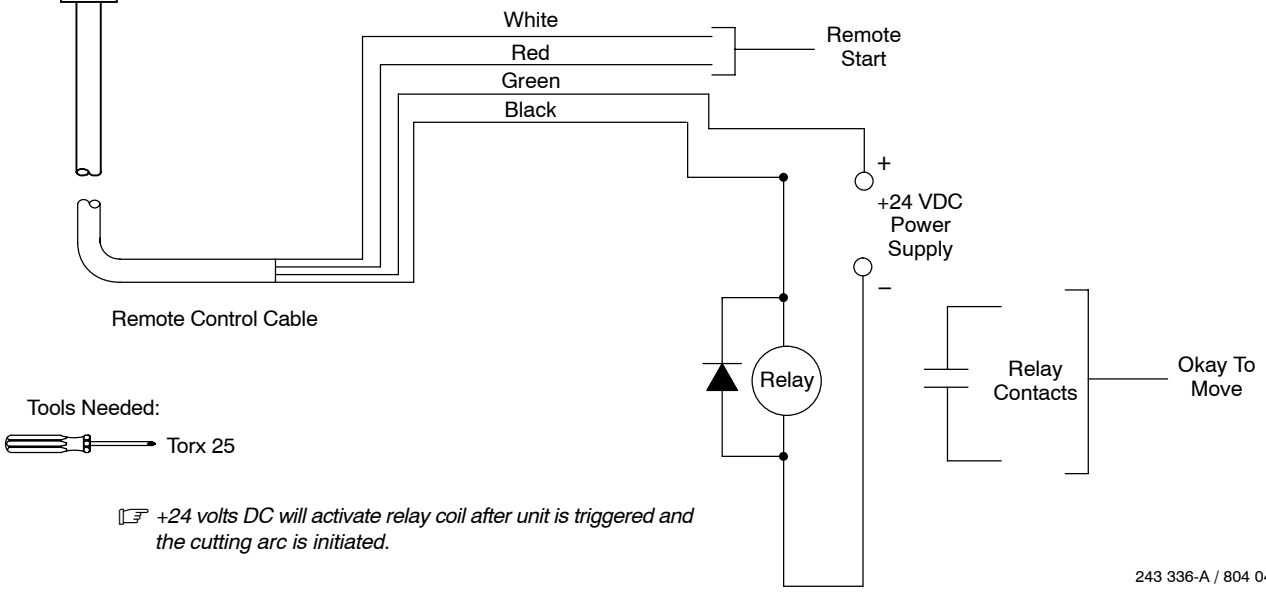
243 336-A / 804 041-A

6-6. Dry Contacts Using An External Power Supply For Relay Operation









Tools Needed:

Torx 25

☞ *+24 volts DC will activate relay coil after unit is triggered and the cutting arc is initiated.*

⚠ Turn off power source and disconnect input power.

Remove wrapper (see Section 7-4).

Control board PC1 can provide dry contacts from receptacle RMT1 to operate a customer-supplied relay using an external power supply for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT1

3 Receptacle RC61

Machine torch equipped units are shipped from factory with plug connected to receptacle RMT1.

Be sure that remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

Required Items:

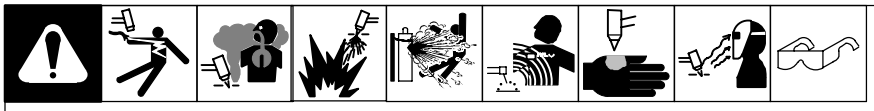
Customer-supplied +24 volts DC power supply.

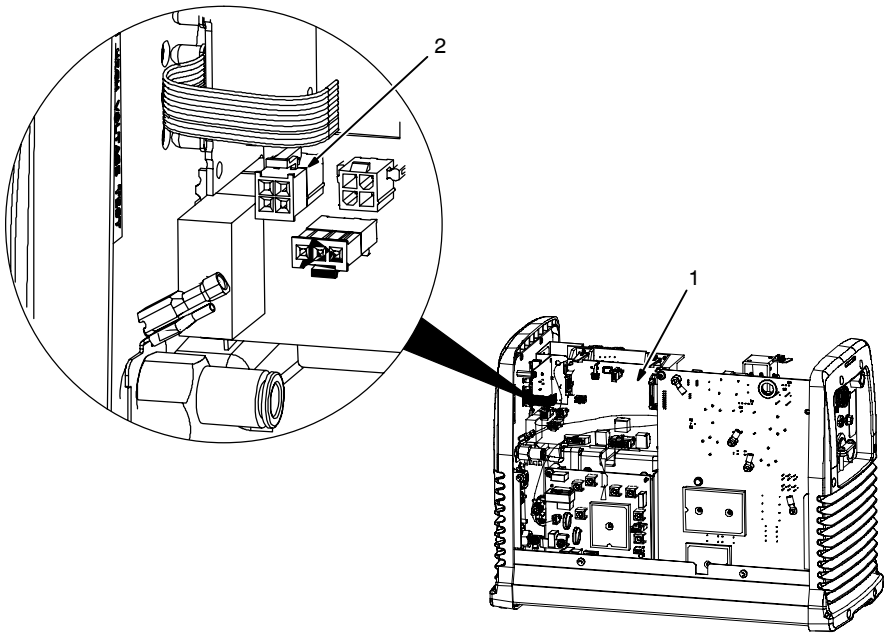
24 volts DC relay coil with resistance greater than 240 ohms.

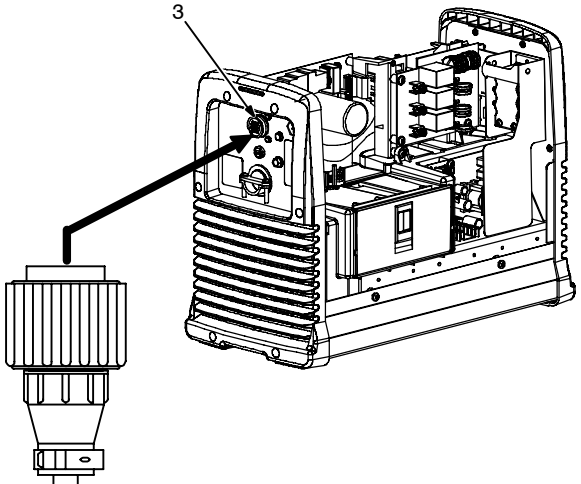
Suppression diode (1A, 100V) such as type IN4002 through IN4004 across relay coil.

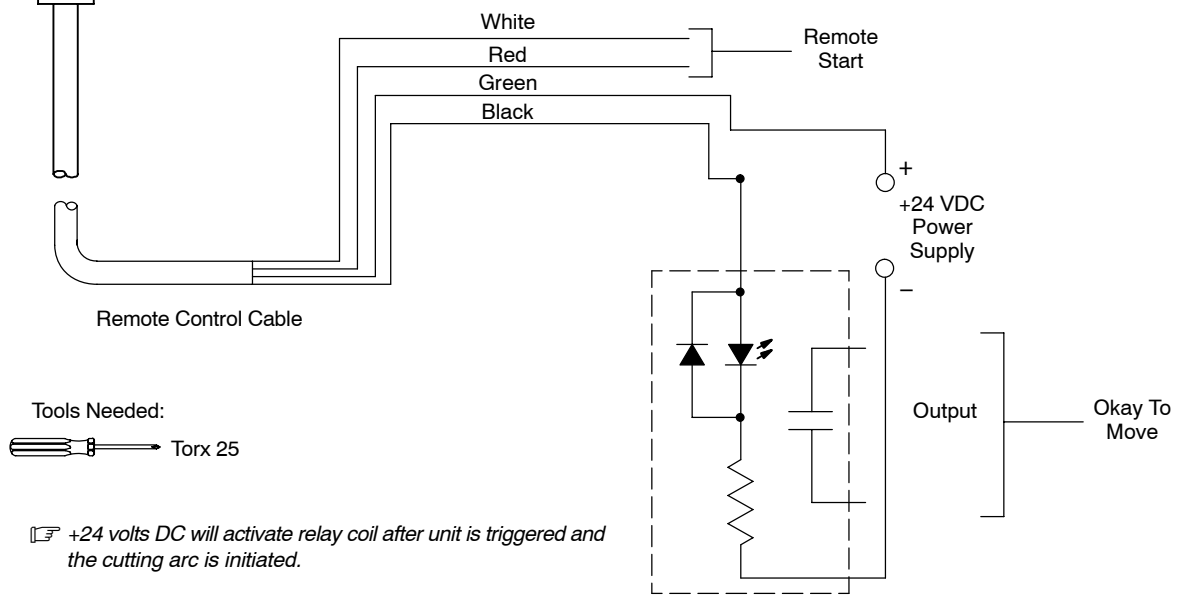
243 336-A / 804 041-A

6-7. Dry Contacts Using An External Power Supply For Isolated Input Module Operation









Tools Needed:

Torx 25

☞ *+24 volts DC will activate relay coil after unit is triggered and the cutting arc is initiated.*

Turn off power source and disconnect input power.

Remove wrapper (see Section 7-4).

Control board PC1 can provide dry contacts from receptacle RMT1 to operate a customer-supplied isolated input module using an external power supply for the Okay To Move signal.

1 Control Board PC1

2 Receptacle RMT1

3 Receptacle RC61

Unit is shipped from factory with plug connected to receptacle RMT1.

Be sure that remote control cable plug is connected to RC61 on rear of unit.

If voltage sensing is required, see Section 6-8.

Install wrapper on unit.

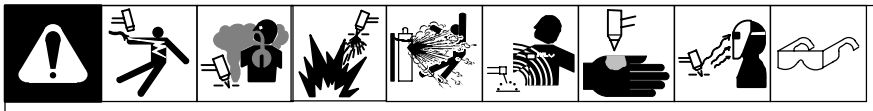
Required Items:

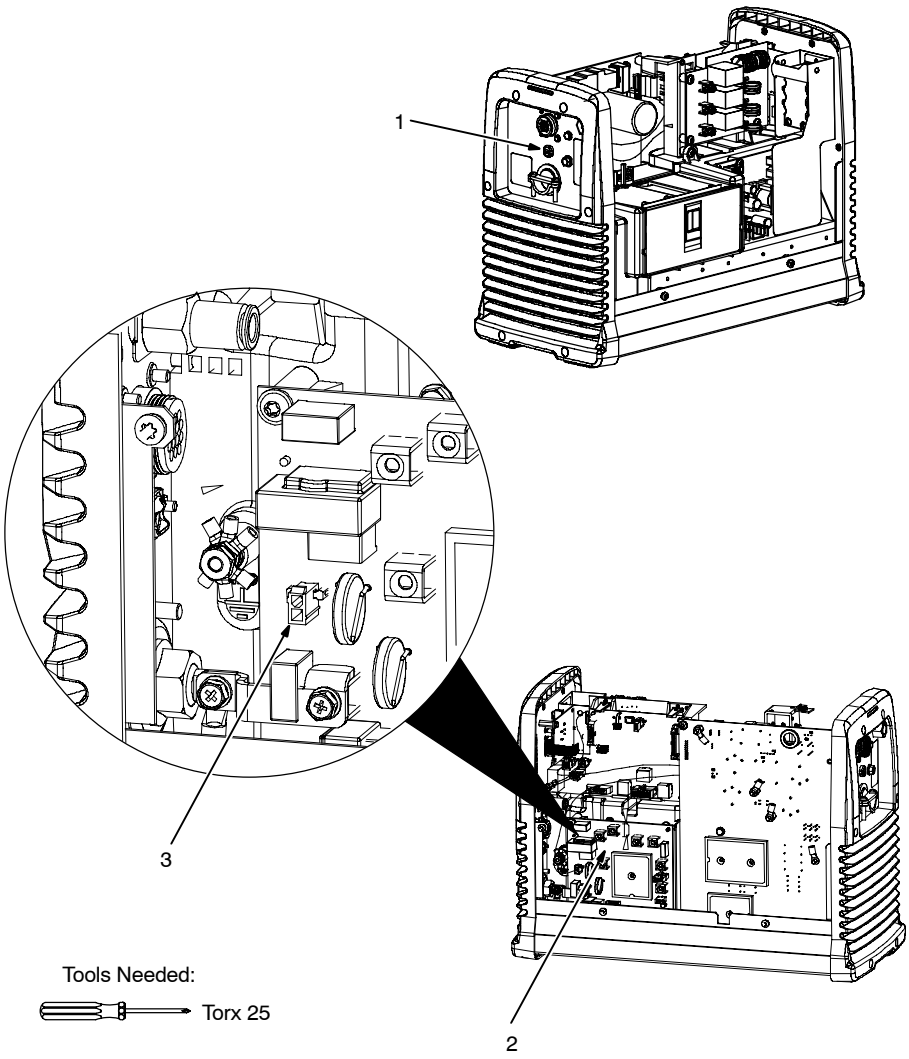
Customer-supplied +24 volts DC power supply.

Isolated input module.

804 041-A

6-8. Remote Voltage Sense Connection





Tools Needed:

Torx 25

Turn off power source and disconnect input power.

Remove wrapper (see Section 7-4).

Remote voltage sense is an arc voltage output signal for automatic torch height adjustment.

1 Snap-in Blank

2 Secondary Interconnect Board PC4

3 Receptacle RC48

Remove snap-in blank from rear panel.

Route plug end of cable through opening in rear panel.

Route plug end of cable over to PC4.

Allowing adequate slack inside the machine, secure cable and strain relief by snapping strain relief into opening in rear panel.

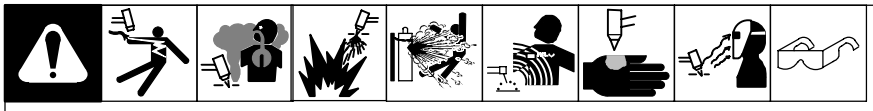
Connect plug to RC48 on PC4.

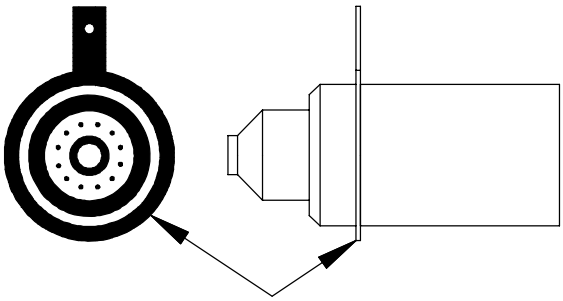
Install wrapper on unit.

Cut off crimped terminals on lead ends, and connect lead 1 to +volts DC (work) and lead 2 to –volts DC (electrode) on customer-supplied voltage sense device.

Ref. 804 041-A / 243 336-A

6-9. Shield Sense Tab





Shield sense tab provides feedback to a compatible torch height controller before starting the cutting process. Place the shield sense tab between the cup and shield.

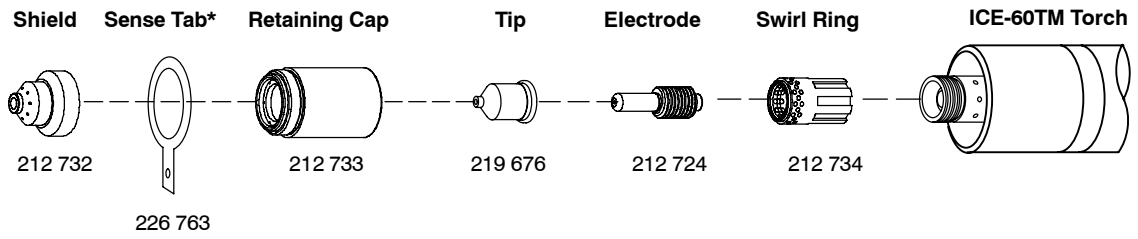
☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Shield sense tab is included only with units originally sold with machine torches.

6-10. Cut Charts

60 Amp Machine Torch Shielded Consumables

The following cut charts are based on a distance of 1/16 in. (1.5 mm) between torch and workpiece for all cuts.



*Shield sense tab 226 763 provides feedback to a compatible torch height controller before starting the cutting process.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	134	0	16 Ga	1.5	627	15926	502	12751
	136		10 Ga	3.4	266	6756	213	5405
	136	0.25	1/4	6.4	131	3327	85	2163
	141	0.75	3/8	9.5	63	1600	41	1041
	143	1.50	1/2	12.7	44	1118	29	726
	147		5/8	15.9	31	787	20	508
	153		3/4	19.0	22	559	14	356

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	134	0	16 Ga	1.5	625	15875	406	10312
	136	0.25	10 Ga	3.4	244	6198	159	4039
	139	0.50	1/4	6.4	112	2845	73	1849
	145	0.75	3/8	9.5	53	1346	34	864
	145	2.00	1/2	12.7	36	914	23	594
	149		5/8	15.9	26	660	17	432
	154		3/4	19.0	18	457	12	305

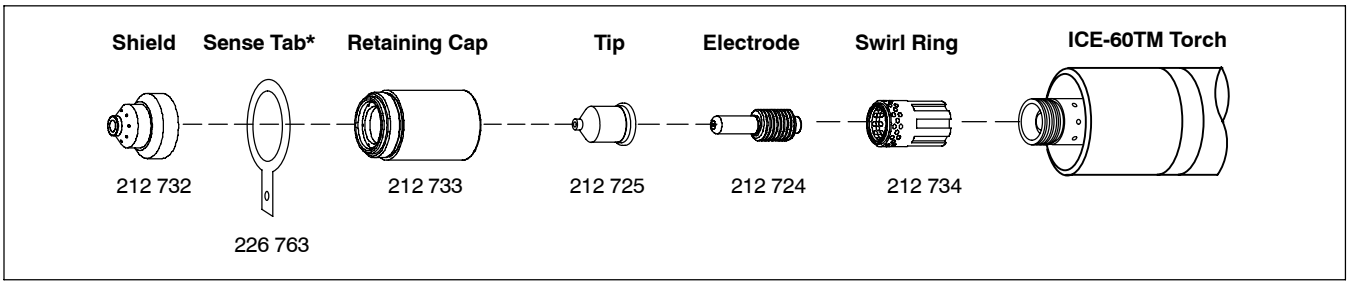
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
60	135	0	1/16	1.6	666	16916	433	10998
	138	0.25	1/8	3.2	400	10160	260	6604
	139		1/4	6.4	147	3734	96	2427
	146	0.75	3/8	9.5	74	1880	48	1219
	147	1.50	1/2	12.7	51	1295	30	762
	153		5/8	15.9	33	838	21	533

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

40 Amp Machine Torch Shielded Consumables

The following cut charts are based on a distance of 1/16 in. (1.5 mm) between torch and workpiece for all cuts.



*Shield sense tab 226 763 provides feedback to a compatible torch height controller before starting the cutting process.

☞ *Shield sense tab is located in the consumable storage box on left side of unit wrapper.*

Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
25	147	0	26 Ga	0.5	638	16205	415	10541
	148		22 Ga	0.8	500	12700	325	8255
	149		18 Ga	1.3	312	7925	203	5156
	152		16 Ga	1.5	176	4470	114	2896
40	144	0.25	14 Ga	1.9	640	16256	221	5613
	146	0.50	10 Ga	3.4	152	3861	99	2510
	147	0.75	3/16	4.7	97	2464	63	1600
	149	1.00	1/4	6.4	73	1854	47	1205

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
25	139	0	26 Ga	0.5	631	16027	410	10414
	139		22 Ga	0.8	496	12598	322	8179
40	142	0.25	18 Ga	1.3	592	15037	335	8509
	143		16 Ga	1.5	374	9500	243	6172
	143		14 Ga	1.9	224	5690	146	3698
	147	0.50	10 Ga	3.4	107	2718	70	1778
	149	0.75	3/16	4.7	67	1702	44	1118
	149	1.00	1/4	6.4	48	1219	31	792

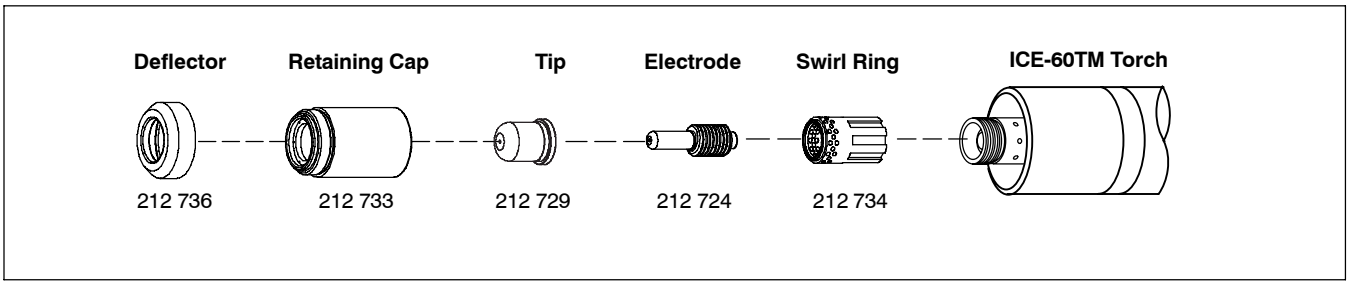
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
25	150	0	1/32	0.8	610	15494	397	10084
	151		1/16	1.5	188	4775	122	3104
40	146	0.25	3/32	2.4	293	7442	190	4826
	149	0.50	1/8	3.2	276	7010	179	4557
	150	1.00	1/4	6.4	78	1981	51	1288

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

40 Amp Machine Torch Extended Consumables

The following cut charts are based on a distance of 1/16 in. (1.5 mm) between torch tip and workpiece for all cuts.



Mild Steel

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
25	125	0	26 ga	0.5	550	13970	353	8966
	128		22 ga	0.8	484	12294	315	8001
	128		18 ga	1.3	232	5893	151	3830
	130		16 Ga	1.5	167	4242	109	2757
40	129	0.25	14 Ga	1.9	336	8534	218	5547

Stainless

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
25	127	0	26 ga	0.5	561	14249	365	9271
	127		22 ga	0.8	453	11506	295	7493
40	123	0.25	18 Ga	1.3	500	12700	325	8255
	127		16 GA	1.5	365	9271	237	6026
	128		14 GA	1.9	220	5588	143	3632

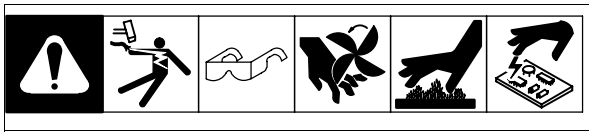
Aluminum

Arc Current	Arc Voltage	Pierce Delay	Material Thickness		Maximum Cut Speeds		Optimum Cut Speeds	
			Inches	mm	IPM	mm/min	IPM	mm/min
25	125	0	1/32	0.8	564	14326	366	9296
	127		1/16	1.5	236	5994	153	3886
40	127	0.25	3/32	2.4	268	6807	174	4425

Without concern for cut appearance, the fastest speed for cutting material is the maximum cut speed. For better cut angle, less dross, and cut surface appearance, use the optimum cut speed. The values in the cut charts are basic starting points and each application may require some adjustment to achieve the best cut characteristics.

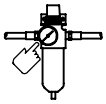
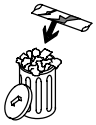
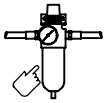
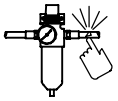
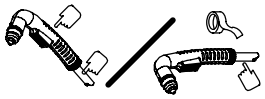
SECTION 7 – MAINTENANCE & TROUBLESHOOTING

7-1. Routine Maintenance



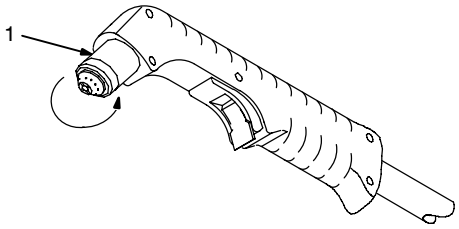
Disconnect power before maintaining.

☞ *Maintain more often during severe conditions.*

	✓ = Check ◇ = Change ◯ = Clean ☆ = Replace * To be done by Factory Authorized Service Agent				Reference
Each Use	 ✓ Torch Tip, Electrode, And Shield Cup	 ✓ Gas/Air Pressure			
Every Week	 ✓ Shield Cup Shutdown System				
Every 3 Months	 ☆ Damaged Or Unreadable Labels	 ☆ Cracked Parts	 ◯ Air Filter/Regulator Assembly Filter	 ✓ Gas/Air Hose	
	 ✓ ☆ Torch Body, Cable				
Every 6 Months	 ◯ Inside Unit				

7-2. Checking Shield Cup Shutdown System

☞ *Power must be reset whenever the cup shutdown system is activated.* ***Always turn Off power when changing or checking consumables. Do NOT overtighten torch shield cup. Gently finger tighten cup onto torch.***



1 Torch Shield Cup

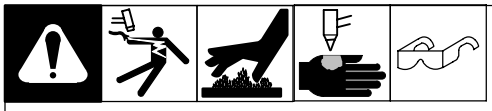
Turn Power On and loosen shield cup. If shutdown system works properly, Cup light comes on. If not, immediately turn Off power and have Factory Authorized Service Agent check unit.

If system works properly, retighten cup and reset power.

☞ *DO NOT overtighten torch shield cup.*

Ref. 801 300-A

7-3. Checking/Replacing Retaining Cup, Tip, And Electrode

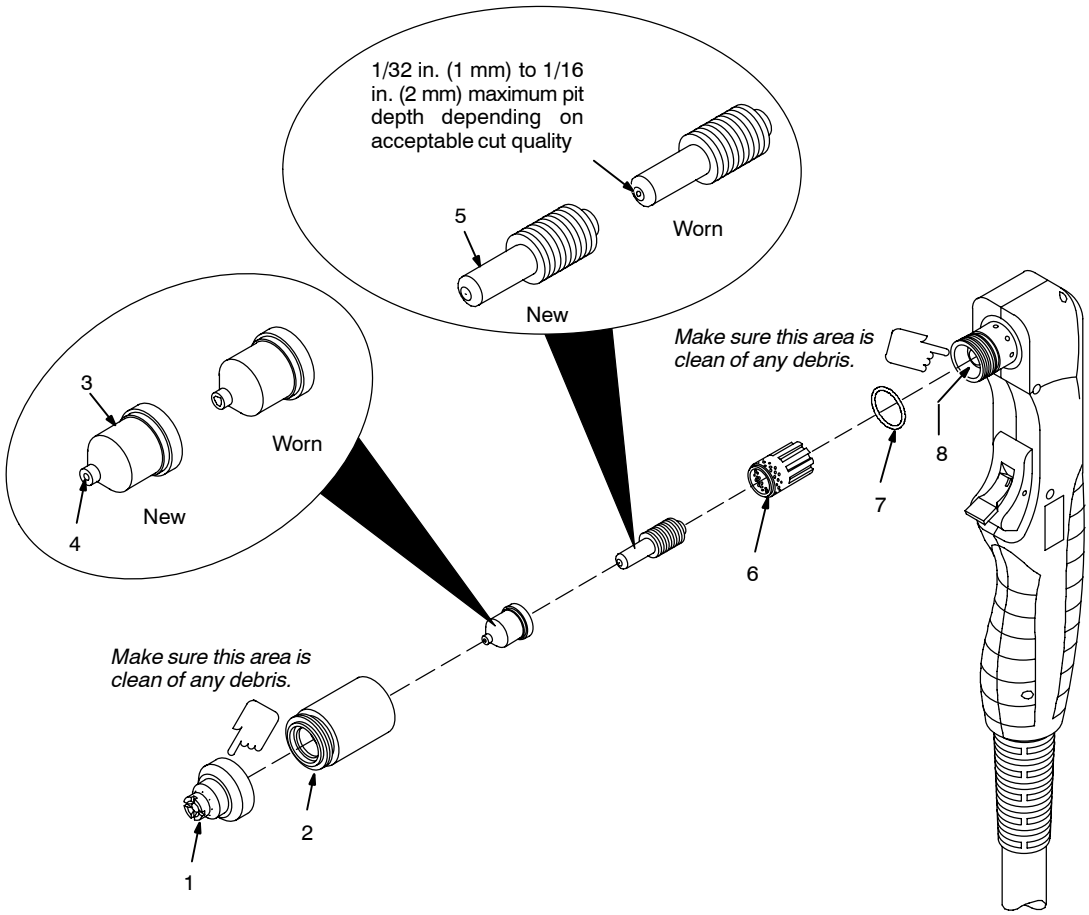


Overtightening will strip threads. Do not overtighten electrode, tip, and retaining cup during assembly. Do not cross-thread parts causing stripping. Use care during torch assembly and parts replacement.

Inspect shield cup, tip, and electrode for wear before cutting or whenever cutting speed has been significantly reduced. Do not operate torch without a tip or electrode in place. Be sure to use genuine replacement parts.

☞ *A good practice is to replace both the tip and electrode at the same time.*

Turn Off power source before checking torch parts.



804 056-A

Turn Off power source.

1 Drag Shield

Check this area for any debris or foreign material. Clean out if necessary.

2 Retaining Cup

Remove retaining cup. Check retaining cup for cracks, and replace if necessary.

3 Tip

4 Opening

Remove tip. Check tip, and replace if opening is deformed or 50% oversize. If inside of tip is not clean and bright, clean with steel wool. Be sure to remove any pieces of steel wool afterwards.

5 Electrode

Check electrode. Performance may degrade if center has a pit more than a 1/32 in. (1 mm) deep, remove and replace electrode.

6 Swirl Ring

Remove swirl ring. Check ring, and replace if side holes are plugged.

7 O-Ring

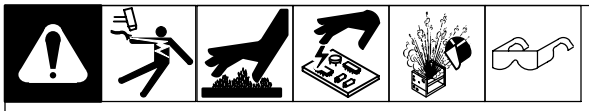
Check O-rings on torch. If needed, coat with thin film of silicone lubricant (part no. 169 231). Replace if damaged.

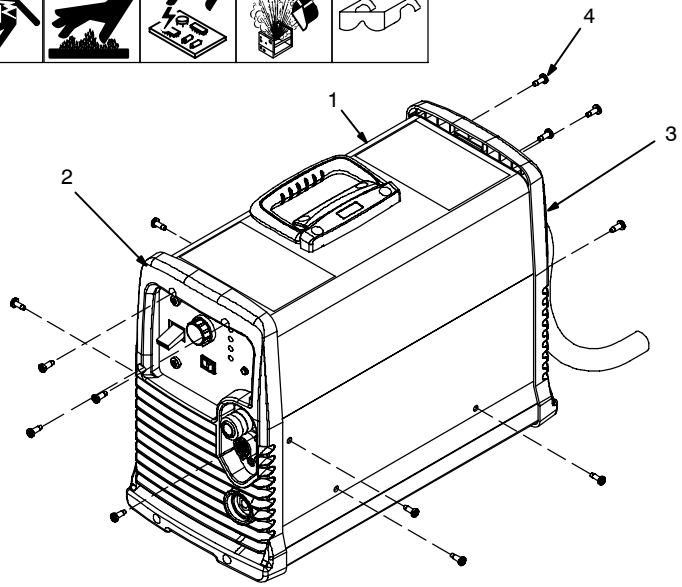
8 Plunger Area

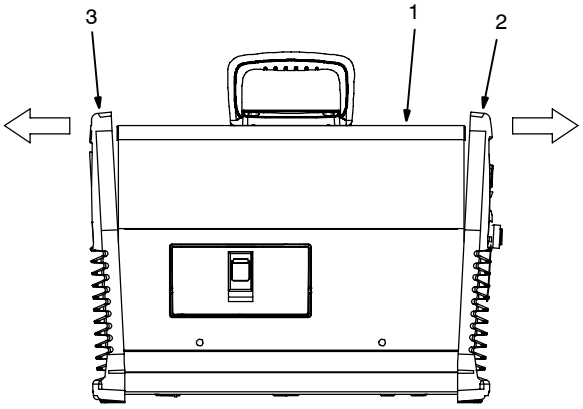
Check this area for any debris or foreign material. Clean out if necessary.

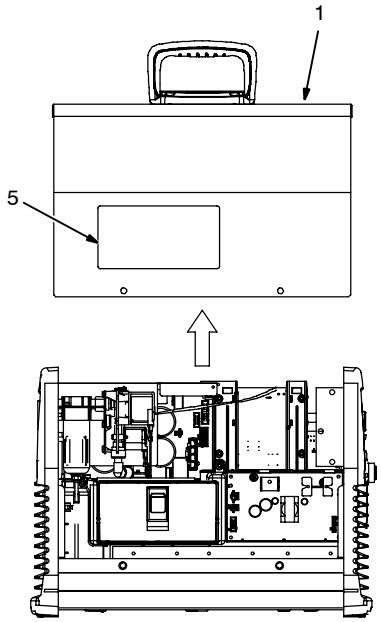
Carefully reassemble parts in reverse order.

7-4. Wrapper Removal/Installation









Turn off power, and disconnect input power plug from receptacle or turn off and lockout/tagout line disconnect device before working on unit.

Significant DC voltage can remain on capacitors after unit is Off. Check to see that front panel lights (LEDs) have stopped flashing and are off before removing wrapper.

1 Wrapper

2 Front Bezel

3 Rear Bezel

4 Torx Screw (Fine Thread)

Remove 13 screws from wrapper, and front and rear bezels as shown.

Spread open tops of front and rear bezels.

5 Consumables Storage Compartment Opening

Be sure that opening clears the storage compartment. Lift wrapper off unit.

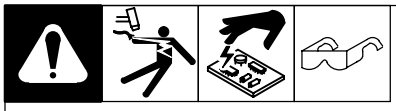
☞ *When installing wrapper, front and rear wrapper flanges must be on outside of front and rear portion of metal chassis.*

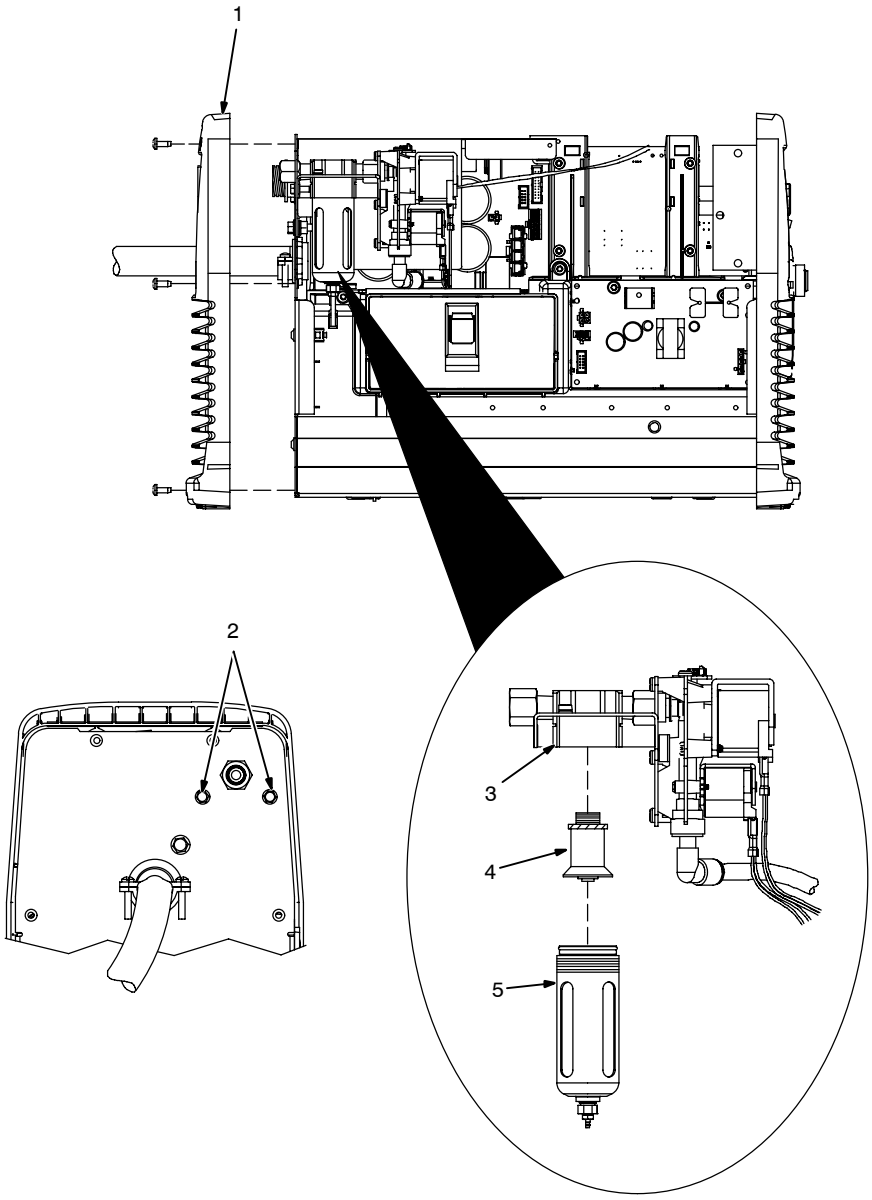
Tools Needed:

Torx 25

805 209-A

7-5. Checking Or Replacing Filter Element (Part No. 227 877)





Turn off power, and disconnect input power plug from receptacle or turn off and lockout/tagout line disconnect device before working on unit.

Significant DC voltage can remain on capacitors after unit is Off. Check to see that front panel lights (LEDs) have stopped flashing and are off before removing wrapper.

Remove wrapper from unit (see Section 7-4).

1 Rear Bezel

Remove rear bezel from unit.

2 Filter Bracket Screws

Remove filter bracket screws. Pull filter bracket toward front of unit until gas/air supply fitting is past rear panel, and swing filter assembly out to the side to allow filter cup removal.

3 Filter Base

4 Filter Element (Part No. 227877)

5 Filter Cup

Unscrew filter cup from base.

Remove cup.

Unscrew filter element from base.

Check filter element for dirt and moisture, and replace if necessary.

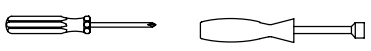
Be sure that all parts are clean and dry.

Reinstall filter element, and secure filter cup.

Secure filter bracket to rear panel.

Reinstall wrapper and rear bezel.

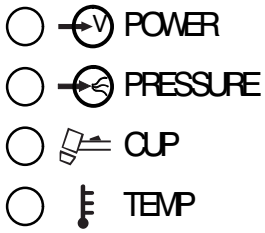
Tools Needed:



5/16 in.

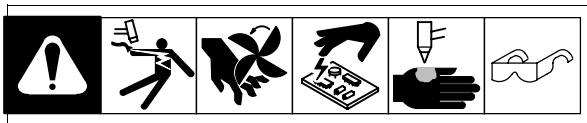
rEF. 805 211-A

7-6. Status/Trouble Lights



Light	Condition	Status/Possible Cause
Power	On	Input power is okay.
Pressure/Cup/Temp	Off	When Power light is on, system is normal if these lights are off.
Power	Flashing rate is steady for 15 seconds or until torch trigger is pressed again, whichever comes first.	Input power was above 300 volts AC or below 156 volts AC, but has returned to normal.
Power	Repetitive flashing rate of two quick cycles, then a one second pause.	Input power is above 300 volts AC or below 156 volts AC or precharge PTCs have overheated.
Pressure	On	No or low [below 40 psi (276 kPa)] input pressure.
Pressure	Flashing rate is steady for 15 seconds or until torch trigger is pressed again, whichever comes first.	Regulated pressure in the unit is low.
Pressure	Repetitive flashing rate of two quick cycles, then a one second pause for a 15 second period.	Regulated pressure in the unit is high.
Cup	On	Torch cup is loose or off. Once cup is finger tightened, unit power must be cycled off and back on again.
Cup	Flashing rate is steady for 15 seconds or until torch trigger is pressed again, whichever comes first.	No arc was established. Plasma system failed to strike an arc.
Cup	Repetitive flashing rate of two quick cycles, then a one second pause for a 15 second period or until torch trigger is pressed again, whichever comes first.	No pilot arc established possibly due to a loss of current.
Cup	Repetitive flashing rate of three quick cycles, then a one second pause for a 15 second period or until torch trigger is pressed again, whichever comes first.	Consumables in torch failed to separate during pilot arc possibly due to being stuck.
Temperature	On	Power source overheated.
Temperature	On (indefinitely)	Power source temperature sensors may have failed or ambient temperature is below -22° F (-30° C).
Temperature	Flashing rate is steady (indefinitely).	Power source temperature sensor provided inaccurate readings, but returned to normal. Unit power must be cycled off and back on again.
For system troubleshooting see Section 7-7 and Section 7-8.		

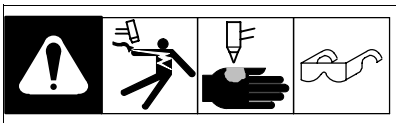
7-7. Troubleshooting Power Source



Trouble	Remedy
No pilot arc; difficulty in establishing an arc.	Clean or replace worn consumables as necessary (see Section 7-3).
	Check for damaged torch or torch cable.
	Check position of cut/gouge switch. If using cutting consumables, be sure that switch is in the CUT position. If using gouging consumables, be sure that switch is in the GOUGE position.
	Check retaining cup. DO NOT overtighten cup, hand-tighten only.
No cutting output; Power light off; status lights off; fan motor FM does not run.	Place Power switch in On position.
	Place line disconnect device in On position (see Section 4-13 or 4-14).
	Check line fuse(s) and replace if needed or reset circuit breakers (see Section 4-13 or 4-14).
Pilot arc working; no cutting output; Power light on; status lights off; fan motor running.	Be sure work clamp is connected to a clean, rust-free workpiece.
	Clean or replace worn consumables as necessary (see Section 7-3).
No gas/air flow; Power light on; status lights off; fan motor running.	Have Factory Authorized Service Agent check for proper torch connections. Check operation of gas valve AS1, and check gas/air system for leaks. Check filter element (see Section 7-5).
Pressure status light On.	Check for sufficient gas/air supply pressure (see Section 4-6).
	Check for dirty air filter and replace, if necessary (see Section 7-5).
	Check air lines for leaks.
	Have Factory Authorized Service Agent check pressure switch and control board.
Cup status light On.	Check torch shield cup (see Section 7-2). Reset power switch.
	If trouble persists, have Factory Authorized Service Agent check torch and unit.
Temperature status light On.	Unit overheating (see Section 4-3). Allow fan to run; the Trouble light goes out when the unit has cooled.
	If trouble persists, have Factory Authorized Service Agent check unit.
Temperature status light On indefinitely.	Power source temperature sensors may have failed or ambient temperature is below –22° F (–30° C). Operate unit in a warmer ambient temperature.
Temperature status light flashing rate steady (indefinitely).	Power source temperature sensor(s) provided inaccurate feedback, but have returned to normal. Unit power must be cycled off and back on again.
Power light flashing steady for 15 seconds or until torch trigger is pressed, whichever happens first.	Input power was above 300 volts AC or below 156 volts AC, but has returned to normal. Have a qualified technician check input line power at idle and while cutting.
Power light is flashes at a rate of two quick cycles and then a one second pause.	Input power is above 300 volts AC or below 156 volts AC. Have a qualified technician check input power at idle and while cutting.
	Pre-charge PTCs are overheated. Allow 15 minutes for unit to cool.
Pressure status light flashes at a rate of two quick flashes and then a one second pause for a duration of 15 seconds.	Unit regulated pressure is too high. Check for input pressure between 90-120 PSI (see Section 4-6). If trouble persists, have a Factory Authorized Service Agent check unit. Reset power switch.
Pressure status light flashes steady for 15 seconds or until torch trigger is pressed, whichever happens first.	Regulated pressure is too low. Check torch for leaks. Check for input pressure between 90-120 PSI during cutting (see Section 4-6).

Trouble	Remedy
Arc goes out while cutting.	Be sure work clamp is securely attached to a clean, paint-free, rust-free workpiece.
	Make sure drag shield is on the workpiece or the extended tip is 1/16 in. (1.6 mm) to 1/8 in. (3.2 mm) from workpiece while cutting (see Section 5-4).
	On thin metal, check travel speed. Constant travel speed must be maintained when cutting thin material.
	Check that compressed air is clean, dry and oil-free. Use filter kit 300491 or 228926, if necessary.
	Check retaining cup. DO NOT overtighen cup, hand-tighten only.
	Clean or replace worn consumables as necessary (see Section 7-3).
Cup status light flashes steady for 15 seconds or until torch trigger is pressed, whichever happens first.	System failed to strike an arc. Power source failed to deliver current to the output. Check continuity of torch connections (pilot lead and electrode lead). If torch connections are good, have a Factory Authorized Service Agent check unit.
Cup status light flashes at a rate of two quick cycles and then a one second pause for 15 seconds or until torch trigger is pressed, whichever comes first.	No pilot arc established. The power source failed to maintain a pilot arc. Try a different set of torch consumables (tip and electrode). Check for input pressure between 90-120 PSI.
Cup status light flashes at a rate of three quick cycles and then a one second pause for 15 seconds or until torch trigger is pressed, whichever comes first.	Power source detected that tip and electrode failed to separate when gas valve turned on. Check that cup is not too tight (finger tight only). Check for correct torch consumables. Check for gas flow through the torch head.
Short tip life.	Check and clean drag shield of any slag, particles, and debris.
	Check position of cut/gouge switch. Place switch in correct position to match the process.
	Check input air pressure.
	Check that compressed air is clean, dry and oil-free. Use filter kit 300 491 or 228 926, if necessary.
	Maintain 1/8 in (3.2 mm) standoff for extended tip cutting over 40 amps. Do not drag tip on workpiece.
If trouble persists, have system checked by a Factory Authorized Service Agent.	

7-8. Troubleshooting Torch



Trouble	Remedy
Arc goes on and off while cutting.	Torch travel speed too slow; increase travel speed (see Section 5-4).
	Clean or replace worn consumables as necessary (see Section 7-3).
	Be sure work clamp is securely attached to a clean, paint-free, rust-free workpiece.
Arc goes out while cutting.	Be sure work clamp is securely attached to a clean, paint-free, rust-free workpiece.
	Make sure drag shield is on the workpiece or the extended tip is 1/16 in. (1.6 mm) to 1/8 in. (3.2 mm) from workpiece while cutting (see Section 5-4).
	On thin metal, check travel speed. Constant travel speed must be maintained when cutting thin material.
	Check that compressed air is clean, dry and oil-free. Use filter kit 300491 or 228926, if necessary.
	Check retaining cup. DO NOT overtighen cup, hand-tighten only.
	Clean or replace worn consumables as necessary (see Section 7-3).
Sparks come out top of cut or cut is not clean.	Torch travel speed too fast; reduce travel speed (see Section 5-4).
	Clean or replace worn consumables as necessary (see Section 7-3).
	Be sure work clamp is securely attached to a clean, paint-free, rust-free workpiece.
	Unit not capable of cutting metals thicker than rating (see Section 4-2) or faster than shown in Section 5-7.

Notes

SECTION 8 – ELECTRICAL DIAGRAM

⚠ WARNING	• Do not touch live electrical parts. • Disconnect input power or stop engine before servicing. • Do not operate with covers removed. • Have only qualified persons install, use, or service this unit.
ELECTRIC SHOCK HAZARD	

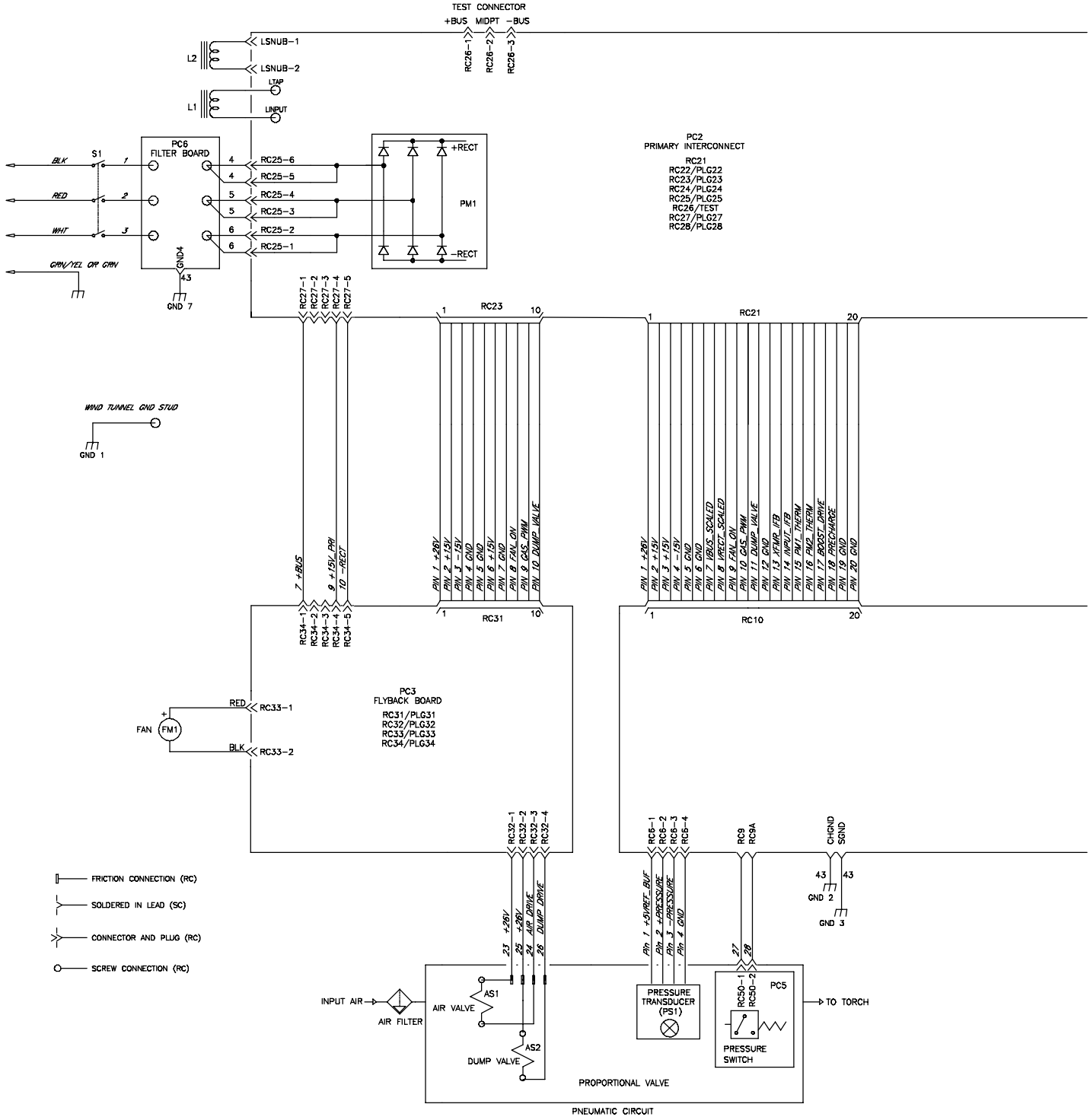
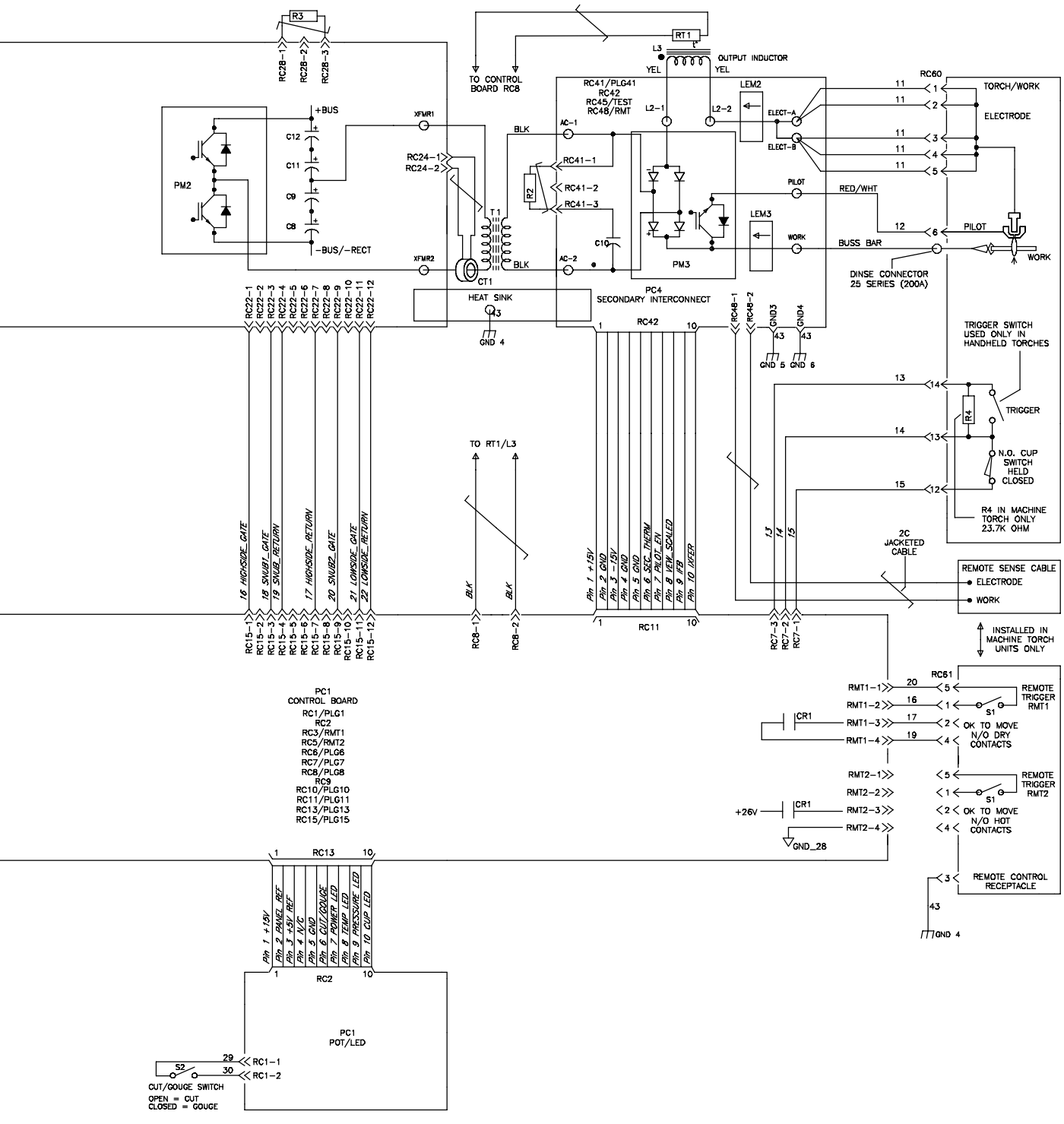


Figure 8-1. Circuit Diagram


R3
RC28-1
RC28-2
RC28-3
TO CONTROL BOARD RC8
RT1
L3
OUTPUT INDUCTOR
YEL
YEL
RC41/PLG41
RC42
RC45/TEST
RC48/RMT
LEM2
L2-1
L2-2
ELECT-A
ELECT-B
RC60
TORCH/WORK
ELECTRODE
+BUS
-BUS/-RECT
C12
C11
C9
C8
PM2
XFMR1
XFMR2
RC24-1
RC24-2
BLK
AC-1
AC-2
RC41-1
RC41-2
RC41-3
R2
T1
CT1
C10
PM3
PILOT
RED/WHT
LEM3
WORK
BUSS BAR
PILOT
WORK
DINSE CONNECTOR
25 SERIES (200A)
HEAT SINK
GND 4
PC4
SECONDARY INTERCONNECT
RC42
RC48-1
RC48-2
GND3
GND4
GND 5
GND 6
TRIGGER SWITCH
USED ONLY IN
HANDHELD TORCHES
TRIGGER
R4
N.O. CUP
SWITCH
HELD
CLOSED
R4 IN MACHINE
TORCH ONLY
23.7K OHM
2C
JACKETED
CABLE
REMOTE SENSE CABLE
ELECTRODE
WORK
INSTALLED IN
MACHINE TORCH
UNITS ONLY
TO RT1/L3
RC22-1
RC22-2
RC22-3
RC22-4
RC22-5
RC22-6
RC22-7
RC22-8
RC22-9
RC22-10
RC22-11
RC22-12
16 HIGHSIDE_GATE
18 SNUB1_GATE
19 SNUB_RETURN
17 HIGHSIDE_RETURN
20 SNUB2_GATE
21 LOWSIDE_GATE
22 LOWSIDE_RETURN
RC15-1
RC15-2
RC15-3
RC15-4
RC15-5
RC15-6
RC15-7
RC15-8
RC15-9
RC15-10
RC15-11
RC15-12
BLK
BLK
RC8-1
RC8-2
Pin 1 +15V
Pin 2 GND
Pin 3 -15V
Pin 4 GND
Pin 5 GND
Pin 6 SEC_THERM
Pin 7 PILOT_EN
Pin 8 VCW_SCALED
Pin 9 VFB
Pin 10 OFFER
RC11
13
14
15
RC7-3
RC7-2
RC7-1
RC61
RMT1-1
RMT1-2
RMT1-3
RMT1-4
20
16
17
19
REMOTE
TRIGGER
RMT1
S1
CR1
OK TO MOVE
N/O DRY
CONTACTS
RMT2-1
RMT2-2
RMT2-3
RMT2-4
REMOTE
TRIGGER
RMT2
S1
+26V
CR1
OK TO MOVE
N/O HOT
CONTACTS
GND_28
REMOTE CONTROL
RECEPTACLE
43
GND 4
PC1
CONTROL BOARD
RC1/PLG1
RC2
RC3/RMT1
RC5/RMT2
RC6/PLG6
RC7/PLG7
RC8/PLG8
RC9
RC10/PLG10
RC11/PLG11
RC13/PLG13
RC15/PLG15
RC13
Pin 1 +15V
Pin 2 PANEL REF
Pin 3 +5V REF
Pin 4 N/C
Pin 5 GND
Pin 6 CUT/GOUGE
Pin 7 POWER LED
Pin 8 TEMP LED
Pin 9 PRESSURE LED
Pin 10 CUP LED
RC2
PC1
POT/LED
29
30
S2
RC1-1
RC1-2
CUT/GOUGE SWITCH
OPEN = CUT
CLOSED = GOUGE

243 018-C

SECTION 9 – PARTS LIST

☞ *A complete Parts List is available on-line at www.MillerWelds.com*

9-1. Recommended Spare Parts

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Recommended Spare Parts	
. . . . .	234843	. .	Label, Ice 60t Consumables	1
. . . . .	227877	. .	Filter, Air Element	1
. . . . .	234838	. .	Cable, Work 20 Ft 6 Ga W/Clamp And Male Dinse	1
. . . . .	234930	. .	Cable, Work 50 Ft 6 Ga W/Clamp And Male Dinse	1
. . . . .	213619	. .	Clamp, Work 300 A Stl Chrome Pld W/Copper Contacts	1
. . . . .	213620	. .	Contact Tip, Work Clamp 300amp Copper	2
. . . . .	234132	. .	ICE–60T 20 Ft Hand Held Replacement Torch Or	
. . . . .	234134	. .	ICE–60T 50 Ft Hand Held Replacement Torch	1
. . . . .	234136	. .	ICE–60TM 25 Ft Machine Replacement Torch	1
. . . . .	234138	. .	ICE–60TM 50 Ft Machine Replacement Torch	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model (located on nameplate on front of unit) and serial number (located on outside bottom of plasma cutter base) is required when ordering parts from your local distributor.

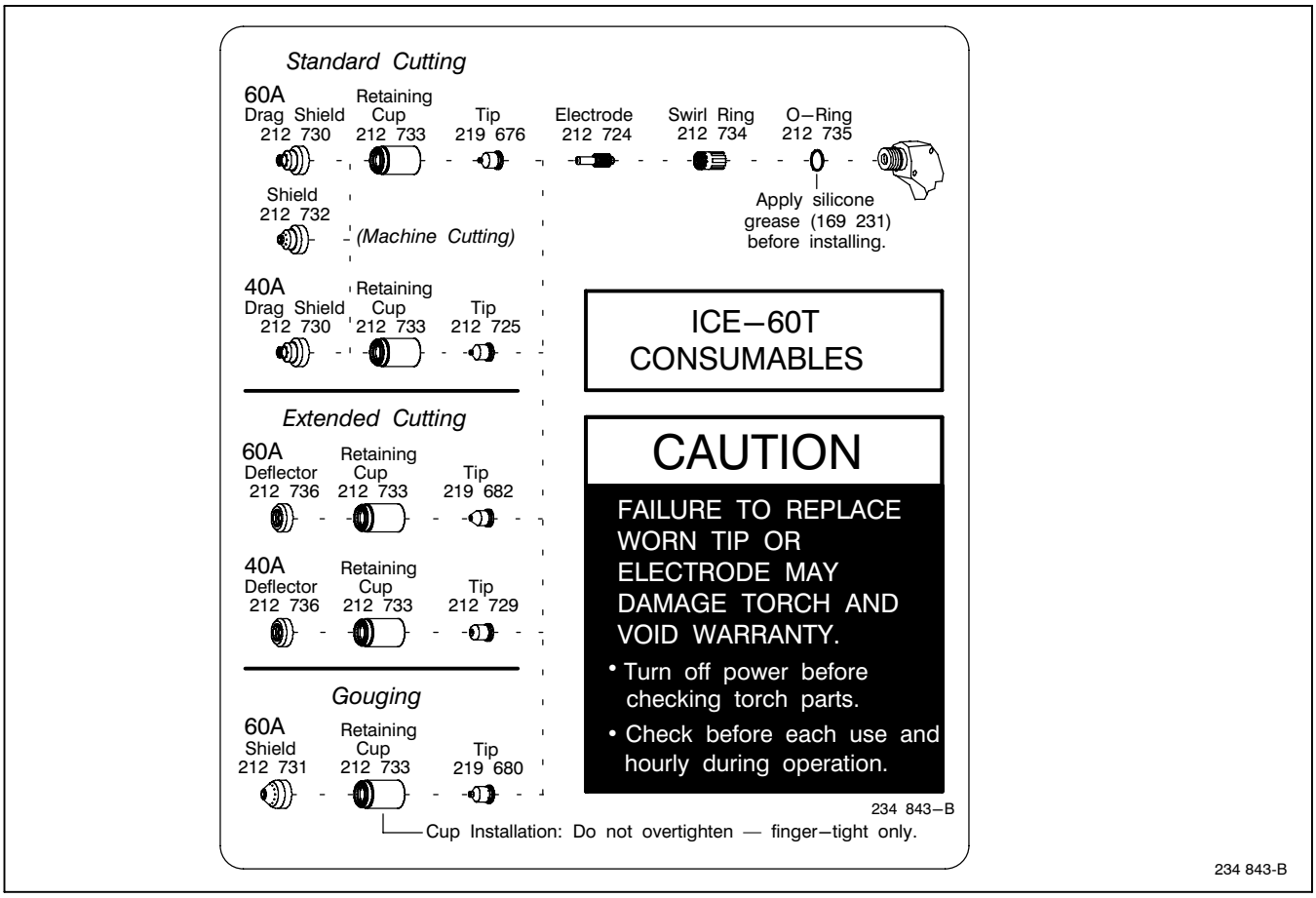
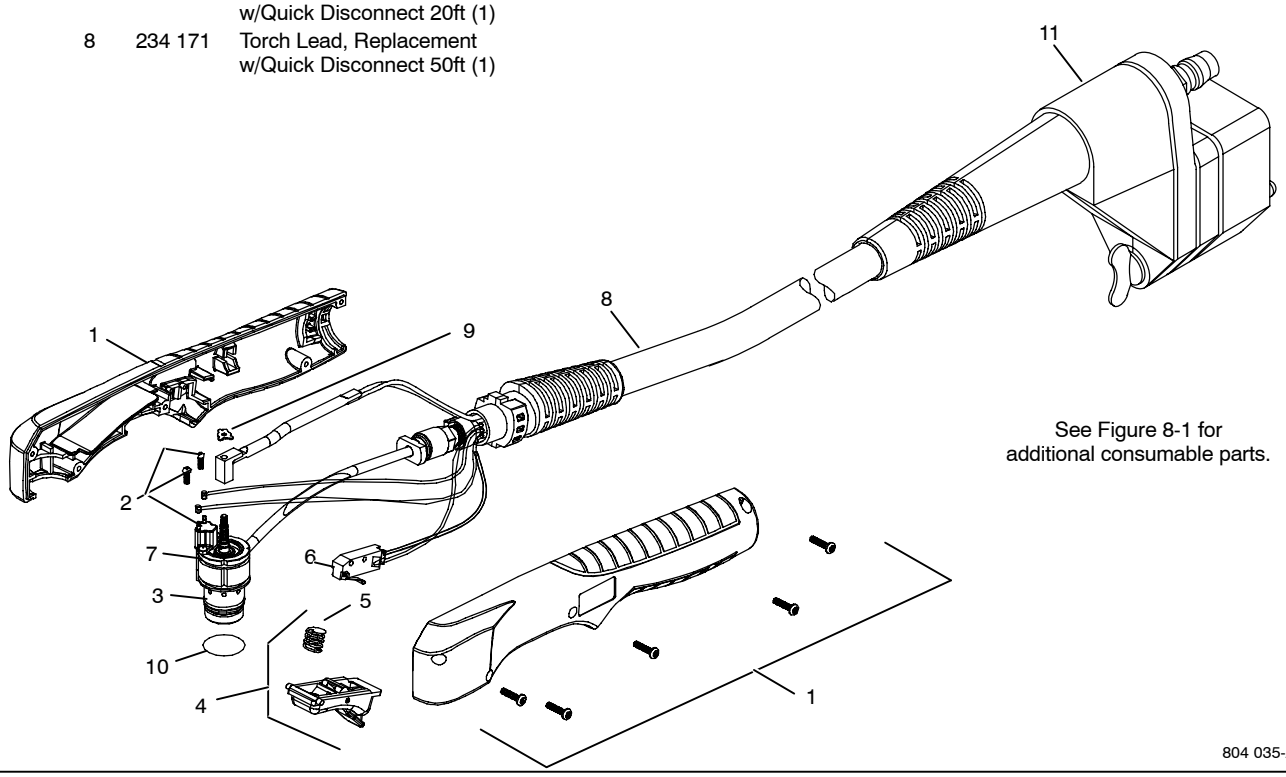


Figure 8-1. Consumable Parts For ICE-60T

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model (located on nameplate on front of unit) and serial number (located on outside bottom of plasma cutter base) is required when ordering parts from your local distributor.

Item No.	Part No.	Description
1	215 594	Handle W/Screws (1)
2	215 478	Kit, Cup Sensor (1)
3	215 479	Torch Head Repair Kit (1)
4	185 833	Switch Assy w/Spring (1)
5	190 220	Trigger Spring (1)
6	215 592	Switch Trigger (1)
7	215 477	Main Body (1)
8	234 170	Torch Lead, Replacement w/Quick Disconnect 20ft (1)
8	234 171	Torch Lead, Replacement w/Quick Disconnect 50ft (1)

Item No.	Part No.	Description
9	215 606	Clip, Retaining (1)
10	212 735	O-Ring, Main Body (1)
11	234 829	Kit, Ice 60T/TM Quick Connect W/Wing Head Fastener (1)
	169 231	Grease, Silicon
	234 132	Torch, Replacement 20 ft (1)
	234 134	Torch, Replacement 50 ft (1)



See Figure 8-1 for additional consumable parts.

Figure 8-2. Torch, ICE-60T

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model (located on nameplate on front of unit) and serial number (located on outside bottom of plasma cutter base) is required when ordering parts from your local distributor.

Item No.	Part No.	Description
1	215 607	Sleeve, Torch Position (1)
2	234 172	Torch Lead, Replacement W/QD 25 ft (1)
2	234 173	Torch Lead, Replacement W/QD 50 ft (1)
3	215 599	Torch Sleeve (1)
4	215 598	Main Body W/Switch (1)
5	195 513	Remote Pendant Control (1)
	234 136	Torch, Replacement 25 ft (1)
	234 138	Torch, Replacement 50 ft (1)
	220 240	Cable, Remote Control Trigger 25 ft (1)
	246 285	Cable, Remote Voltage Sense 26.5 ft (1)
6	234 829	Kit, Ice-60t/Tm QD W/Wing Head Fastener
7	215 606	Clip, Retaining

See Figure 8-1 for additional consumable parts.

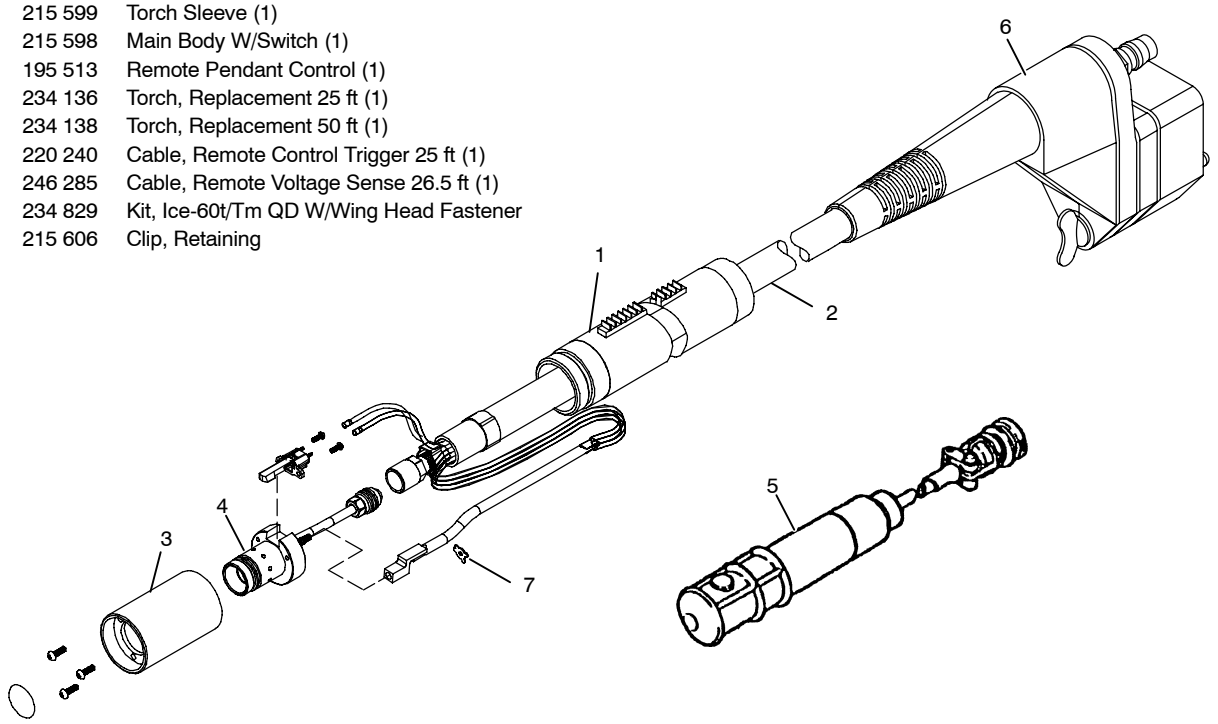


Figure 8-3. Torch, ICE-60TM

A complete Parts List is available on-liine at www.MillerWelds.com

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model (located on nameplate on front of unit) and serial number (located on outside bottom of plasma cutter base) is required when ordering parts from your local distributor.

Notes

Notes

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller

TRUE BLUE® WARRANTY

Effective January 1, 2010
(Equipment with a serial number preface of MA or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
   * Original main power rectifiers only to include SCRs, diodes, and discrete rectifier modules
2. 3 Years — Parts and Labor
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
   * Inverter Power Sources (Unless Otherwise Stated)
   * Plasma Arc Cutting Power Sources
   * Process Controllers
   * Semi-Automatic and Automatic Wire Feeders
   * Smith 30 Series Flowgauge and Flowmeter Regulators (No Labor)
   * Transformer/Rectifier Power Sources
   * Water Coolant Systems (Integrated)
3. 2 Years — Parts
   * Auto-Darkening Helmet Lenses (No Labor)
4. 1 Year — Parts and Labor Unless Specified
   * Automatic Motion Devices
   * CoolBelt and CoolBand Blower Unit (No Labor)
   * External Monitoring Equipment and Sensors
   * Field Options (NOTE: Field options are covered for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
   * Flowgauge and Flowmeter Regulators (No Labor)
   * RFCS Foot Controls (Except RFCS-RJ45)
   * Fume Extractors
   * HF Units
   * ICE Plasma Cutting Torches (No Labor)
   * Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
   * Load Banks
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * PAPR Blower Unit (No Labor)
   * Positioners and Controllers
   * Racks
   * Running Gear/Trailers
   * Spot Welders
   * Subarc Wire Drive Assemblies
   * Water Coolant Systems (Non-Integrated)
   * Weldcraft-Branded TIG Torches (No Labor)
   * Work Stations/Weld Tables (No Labor)
5. 6 Months — Parts
   * Batteries
   * Bernard Guns (No Labor)
   * Tregaskiss Guns (No Labor)
6. 90 Days — Parts
   * Accessory (Kits)
   * Canvas Covers
   * Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
   * M-Guns
   * MIG Guns and Subarc (SAW) Guns
   * Remote Controls and RFCS-RJ45
   * Replacement Parts (No labor)
   * Roughneck Guns
   * Spoolmate Spoolguns

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, relays, work station table tops and welding curtains, or parts that fail due to normal wear. (Exception: brushes and relays are covered on all engine-driven products.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip

For Service

Contact a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Training (Schools, Videos, Books) Technical Manuals (Servicing Information and Parts) Circuit Diagrams Welding Process Handbooks To locate a Distributor or Service Agency visit www.millerwelds.com or call 1-800-4-A-Miller
Contact the Delivering Carrier to:	File a claim for loss or damage during shipment. For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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For International Locations Visit
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